The Stourbridge Lion

Fully working replica of the Stourbidge Lion that was made at the D&H shops at Colonie, NY, and exhibited at the Century of Progress Exposition at the 1933 World's Fair in Chicago. This replica is now on display at the Wayne County Historical Society, Honesdale, PA. Photograph by Jim Shaughnessy, March 1973, at the D&H shops at Colonie, NY.

S. Robert Powell, Ph.D.

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A History of the

Delaware and Hudson Canal Company

in 24 Volumes

S. Robert Powell, Ph.D., 1974
Indiana University, Bloomington, IN

Acknowledgements

The vast majority of those among us who take it upon themselves to write history books give it their best to record facts. When in doubt, such historians invariably qualify data or material presented with statements such as: “Based on the data presently available, it appears that . . .” or “Given the fact that John Smith was working for that company at that time, I shouldn’t wonder if he knew that that company was actively involved in the production of hazardous. . .” You get the picture. Regrettably, there are among us those who lack integrity, honesty, and respect for the historical record who take it upon themselves to fabricate history to serve their own parochial objectives.

In writing this volume on the *Stourbridge Lion*, I have come upon two or three unsavory characters whose disgraceful and shoddy method of writing the history of the *Stourbridge Lion* has muddied the waters, so to speak, about that engine—and about other engines imported from England by the D&H in the early nineteenth century—and the history of the Delaware and Hudson Canal Company.

One of those charlatans, who worked in the nineteenth century, made up the “facts” that he needed to fill in the blanks. Fortunately, he was exposed many years ago. Regrettably, however, others, who worked after him, were misled by those “facts”, which further muddled the historical record. A couple of other ersatz D&H historians, working in the twentieth and twenty-first centuries, decided “to enrich” the historical record by announcing the discovery of suspect artifacts which, as they have been presented, require the re-writing of the historical record.

In writing the present volume on the *Stourbridge Lion*, and all of the volumes in this series, we have distanced ourselves from such unsavory characters and their works. With the passage of time, with any luck, the damage that has been inflicted upon the historical record by such quacks will become known to all, making additional damage unlikely.

That being said, to write a historical record about the *Stourbridge Lion* in the years before 1880, when the D&H began to celebrate its early history, is a process made difficult by the fact that many of the D&H records for the years up to 1880 are no longer extant. But records do exist, and based on (1) those records, (2) the first-person accounts of highly credible individuals from the nineteenth century, among whom are John Bolton, Jason Torrey, John Jervis, Philip Hone, and Horatio Allen, (3) the newspaper accounts written by the journalists and editors of Carbondale and Honesdale newspapers from the nineteenth century, and (4) the publications of first-class railroad historians, among whom are Vernon Leslie, Albert Rutherford, Raymond State, and the editors of the *Delaware and Hudson Canal Company Bulletin*, we have written the present volume.

In the years ahead, with any luck, what we have written will be regarded as a useful document by those who are interested in the history of the Delaware and Hudson Canal Company.

S. Robert Powell
February 16, 2017

Overview

The industrial revolution in America was born on October 9, 1829, in Carbondale, PA, when the first cut of Delaware & Hudson Gravity Railroad coal cars, loaded with mass produced anthracite coal, headed up Plane No. 1 out of Carbondale for Honesdale and to market in New York City.

Those cars, filled with anthracite coal from mines in Carbondale, traveled over 16 miles of railroad tracks, made up of eight inclined planes and three levels, to Honesdale, where the coal was transferred into canal boats and hauled 108 miles, through the D&H Canal, to the Hudson River.

Most of the coal that was sent through the D&H system in the course of the nineteenth century was shipped south on the Hudson River to the New York metropolitan market and to many ports on the Atlantic seaboard, north and south of New York. A large quantity of anthracite coal was also shipped up the Hudson River to Albany, and shipped through the Erie Canal to the American Midwest.

The mining, manufacturing, and transportation system that became operational on that day between the anthracite mines of the Lackawanna Valley and the retail markets for that coal on the eastern seaboard and in the American Midwest was the product of enlightened entrepreneurial, technological, and managerial thought on the part of the officers, managers, directors, and employees of the Delaware and Hudson Canal Company. That system, the first private sector million-dollar enterprise in American history, was, at the same time, the pioneer expression on this continent of mass production, a mode of production that would thereafter characterize industry in America and around the world.

Mass production, the revolutionary engine that made it possible for the D&H to launch its mining, manufacturing, and transportation system in Carbondale on October 9, 1829, and to perpetuate that system well into the 20th century, came into existence when it did and lasted for as long as it did because a body of employees

and managers, within the context of a community, of which both groups were a part, chose to work together for their mutual benefit and enrichment, to mass produce and market a commodity, and in so doing to implement the clearly articulated production and marketing objectives of “the company,” the Delaware and Hudson Canal Company.

In this 24-volume work on the D&H,* we will (1) document the history of that mining, manufacturing, and transportation system, with a special focus on the rail lines of the Delaware and Hudson Canal Company in northeastern Pennsylvania, from the opening of the D&H Gravity Railroad in 1829 to the anthracite coal strike of 1902; and (2) demonstrate that the history of that mining, manufacturing, and transportation system, the D. & H. C. Co., from 1829 to 1902, is, at the same time, not only an illustration of eight decades of fine tuning by the D&H of their mass production procedures and techniques but also a full-bodied expression and record, both from the point of view of the D&H and from the point of view of its employees, of the birth, development, and first maturity of the industrial revolution in America.

This is a success story, directed by America’s pioneer urban capitalists, and implemented by them and the tens of thousands of men, women, and children who emigrated from Europe to the coal fields of northeastern Pennsylvania in the nineteenth century to work for and with the D&H and to start their lives over again. This is a success story that is important not only within in the context of local, state, and regional history but also within the context of American history. It is a compelling story.

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*The present volume focuses on *The Stourbridge Lion.* Each of these 24 volumes will focus on one aspect of the history of the Delaware and Hudson railroad, from the opening of the Gravity Railroad in 1829 to the anthracite coal strike of 1902. Each volume will be an autonomous entity and published separately.

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1901

Railroads before the *Stourbridge Lion*

What railroads/rail facilities existed in America at the time of test run of the *Stourbridge Lion* on August 8, 1829?

There were two "railroads" in operation in America before the D&H test run of the *Stourbridge Lion* on August 8, 1829.

1. The Quincy, MA, Tramroad:

In a "letter to the editor" of *The Sun* by Henry V. Poor of June 2, 1904 (Poor's letter reprinted in the June 3, 1904 issue of a Carbondale newspaper; clipping in the Gritman scrapbook) in which he cites a portion of a February 9, 1901 letter that he (Poor) received from Mr. Stuyvesant Fish, president of the Illinois Central Railroad on the occasion of the fiftieth anniversary of the incorporation of that company, we read:

"The railroad first undertaken in the United States was a short line, worked by horse power, of about three miles, for the transportation of granite to the Neponset River, near Boston. This road was simply a copy of the tramroads* already in use in England. It is important only as the pioneer in the great movement that was then taking place."

> *A very good work on one such British tramroad is *The Brecon Forest Tramroads* by Stephen Hughes; which was published in 1990 by The Royal Commission on Ancient and Historical Monuments in Wales. The Brecon Forest Tramroad, which ran to the northern end of the Swansea Canal, was one of three tramroad lines built from industrial south Wales to rural mid Wales in the early nineteenth century. The two others were the Hay and Kingston Railways, and three contiguous tramroads connecting Hereford to the Brecknock & Abergaveny Canal.

About that Quincy, MA railroad, we read the following on a newspaper clipping in the archives of the Wayne County Historical Society from a Wayne County newspaper, dated July 24, 1912, p. 1:

"Magazine Tells of Old Locomotive. / *Railroad Man's* for August has a Long Account of First Engine to Run in America. / In the *Railroad Man's* magazine for August appears an article [about the *Stourbridge Lion]* that will be of interest to everyone in Honesdale. . . / The first railroad built in the United States was three miles in length. It extended from the granite

quarries of Quincy, Massachusetts, to the Neponset River. This road was commenced in 1826, and completed in 1827. It was built with granite sleepers*, seven and a half feet long, laid eight feet apart. The rails were of pine, and one foot deep. They were covered with an oak plate, and the oak plate with flat bars of iron. The gage was five feet."

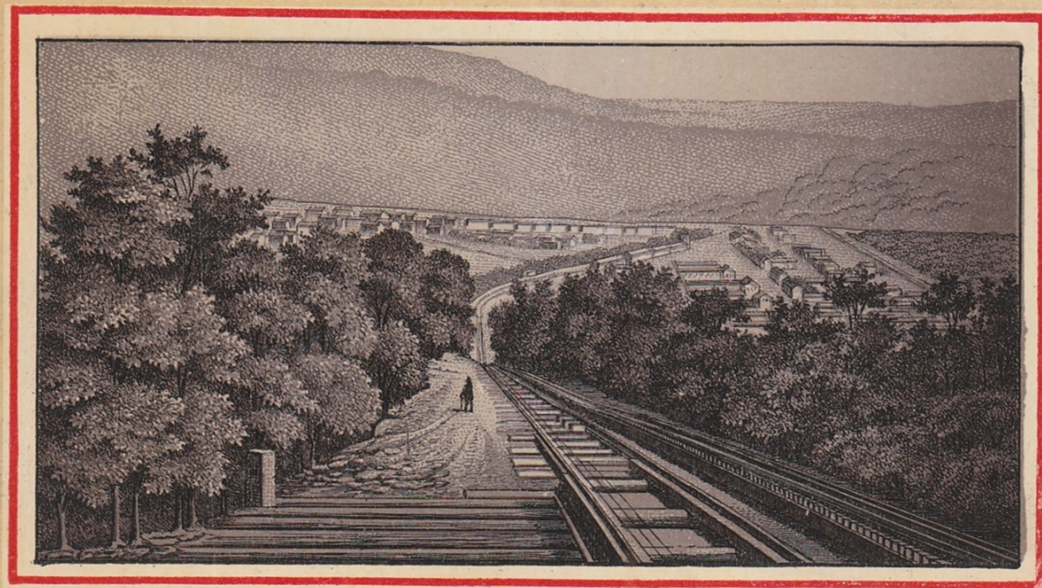
> * A *railroad tie/railway tie/crosstie* (North America) or *railway sleeper* (British Isles and Australia) is a rectangular support for the rails in railroad tracks.

2. The Mauch Chunk Switchback:

In that same article from *Railroad Man's* magazine cited above, we read the following about the Mauch Chunk switchback:

". . The second railroad was commenced in January 1827, and completed in May of the same year, extending from the coal mines of Mauch Chunk, Pennsylvania, to the Lehigh River, a distance of nine miles. From the summit of the road, and within half a mile of the mines, the descent by a plane was 982 feet, inclined 225 feet to the river, and thence twenty-five feet in a chute to the spot where the cars were discharged into the boats. / The cars descended by gravity with the loaded wagons, and were drawn up again by mules. The rails of the road were of timber, laid on wooden sleepers, and strapped with flat iron bars."

Given below is an original photo card in the collection of the Carbondale Historical Society and Museum of the Mauch Chunk switchback railroad. This photograph is titled: "Looking down Mt Pisgah. Switch Back":



Looking down M^t Pisgah. Switch Back.

During the planning process that resulted, ultimately, in a transportation system between the Lackawanna Valley and the Hudson River, Benjamin Wright, the father of American civil engineering, on September 30, 1826, endorsed a railway from the mines in Carbondale to the forks of the Dyberry (Honesdale). On April 4, 1827 the D&H directors authorized a survey for the rail line from Carbondale to Honesdale.

John Jervis, the chief engineer, who was responsible for planning an effective mechanical system and laying out a route by means of which coal could be moved from Carbondale to Honesdale, then visited the Quincy railroad. There he examined both the level sections of the road and the 315-foot long inclined plane which overcame an 84-foot difference in elevation by means of an inclined plane with a continuous chain, with empty cars serving as a partial counterweight to the descending ones.

Jervis, having learned a lot at Quincy, presented his plans for the D&H railroad in a report to the D&H managers in October 1827.

Such were the railroads in America before the Delaware and Hudson Canal Company's Gravity Railroad from Carbondale to Honesdale. For details on that rail line, see Volumes I- V in this D&H series.

1902

Steam Engines, Mobile and Stationary, before the *Stourbridge Lion*

Before we take an in-depth look at the *Stourbridge Lion*, it would be well to focus on the steam engines, mobile (steam locomotives) and stationary (stationary steam engines), that were components of American rail systems when the *Stourbridge Lion* made its celebrated run on August 8, 1829.

There were no steam locomotives in America at the time.

In that same Fish/Poor letter that we quoted from above, we read the following about the first three steam locomotives made in America:

"The first locomotive built in this country, and the second ever in use in it was made at the West Point Foundry Works in New York in 1830. It was called *The Best Friend of Charleston*, having been built for use on the South Carolina Railroad, then in process of construction. It reached Charleston on Oct. 23, 1830, and was placed on the road Nov. 2, 1830. / The second engine constructed in this country was by the same parties, for the same road. / The third, also constructed by the West Point company, was placed on the Mohawk and Hudson, now a part of the New York Central Railroad, 1831, and weighed three tons. It was used on the summit between the two planes, worked by stationary engines, that near Albany having a length of 3,102 feet; that near Schenectady, 2,046 feet. One of English manufacture, weighing six tons, imported for its use, was discontinued on account of its weight, which was too great for the track."

The facts reported in the Fish/Poor letter given above are seconded in Robert A. Lowe's excellent article on the West Point Foundry ("When New York Was America's Locomotive Building Capital") that was published in the September 2016 issue of the *Bridge Line Historical Society Bulletin* (pp.22-23, 46).

In that article, Lowe establishes the connection between the entry of the West Point Foundry into the steam locomotive business and the arrival of the *Stourbridge Lion* in America, as follows:

"Two of the four engines were assembled by West Point from the imported 'kits'. Only one of the engines, the famous *Stourbridge Lion*, actually went into service."

In 1829, West Point entered the locomotive business when four engines were imported from England by the Delaware & Hudson Canal Company for conveying coal between the mines at Carbondale and canal boats at Honesdale, PA. Two of the four engines were assembled by West Point from the imported "kits". Only one of the engines, the famous *Stourbridge Lion*, actually went into service. It proved to be too heavy and rigid for the light tracks of the D&H Canal Company. It remains uncertain what happened to the other three sisters.

Lowe also makes the point that the West Point Foundry in lower Manhattan made stationary steam engines in the period 1823/24-1840. He says:

"The Manhattan operation primarily produced stationary steam engines. . . "

The Manhattan operation primarily produced stationary steam engines, rather than being a locomotive erecting shop, and thus there would have been no trackage. West Point Foundry advertised the "manufacture" on short notice of machines of every description, such as "church bells and brass castings", cannon, shot shells, millwork, pipes, calendar rollers, rolling and slitting mill rollers, and cotton and other small machinery cast from the cupola". An 1829 ad announced:

"The Proprietors of the West Point Foundry, have in addition to their works in Putnam County, established an extensive Steam-Engine Factory on Beach Street, New York, and are prepared to manufacture on short notice, Machinery of every description, viz. Steam Engines, Wrought Iron or Copper Steam Boilers, Tanks, Sugar Boilers, Water Presses, Cotton Screw Presses with double reversed threads, [and] Paper Mill Screws".

The stationary steam engines that were installed at the heads of Planes Nos. 1-5 on the Gravity Railroad when it opened in 1829 were not imported. They were made in America, and it is our contention that they were made at the West Point Foundry, possibly at Cold Spring, which was 50 miles up the Hudson from New York City, and across from West Point. The West Point Foundry Association was organized at Cold Spring in 1817.

Here is the complete text of Robert A. Lowe's excellent article:

West Point Foundry (corner of Beach and West Streets in lower Manhattan) and in Cold Spring, NY)

West Point Foundry in NYC from 1823/24-about 1840. This was a branch of the man foundry, which was 50 miles up the Hudson River at Cold Spring, across from West Point.

The West Point Foundry

The West Point Foundry operated in New York City and Cold Spring, N.Y. It occupied the northeast corner of Beach and West Streets in lower Manhattan from 1823-1824 until about 1840, with a mid-block yard on the south side of Beach Street. This was a branch of the main foundry, which was located 50 miles up the Hudson River in Cold Spring, across from West Point. The Manhattan operation was mainly a machine and finishing shop and a transshipment center for the main foundry.

In 1829, West Point entered the locomotive business when four engines were imported from England by the Delaware & Hudson Canal Company for conveying coal between the mines at Carbondale and canal boats at Honesdale, PA. Two of the four engines were assembled by West Point from the imported "kits". Only one of the engines, the famous *Stourbridge Lion*, actually went into service. It proved to be too heavy and rigid for the light tracks of the D&H Canal Company. It remains uncertain what happened to the other three sisters.

"Two of the four [D&H] engines were assembled by West Point from the imported 'kits'. Only one, the famous Stourbridge Lion, actually went into service."

Parts cast at Cold Spring were assembled in 1830 to produce *The Best Friend of Charleston*, the first American domestic locomotive, built for the South Carolina Canal & Railroad Co. Ten more engines were assembled, including in 1832 the *Experiment* or *Brother Jonathan*, which had a 4-wheeled leading truck, built for the Mohawk & Hudson RR. However, locomotive building never caught on; production stopped around 1835. The Manhattan operations closed around 1840.

Eleven locomotives made at West Point Foundry, 1830-1835; Manhattan operations closed around 1840.

Beginnings

In 1817, the West Point Foundry Association was organized in Cold Spring, and a large molding house, boring mill, pattern shop, and water supply dam were built by Governeur Kemble and associates. At first a blast furnace refined local iron ore, but that was soon exhausted. The Kembles were wealthy and politically well connected, so they received many government subsidies and contracts (sound familiar?). A Manhattan office was opened, headed by Brother William, but Cold Spring always remained the main center of business. The

"The Manhattan operation [of the West Point Foundry] primarily produced stationary steam engines, rather than being a locomotive erecting shop. . .."

It is our contention that the five stationary steam engines that were installed in the 1829 configuration of the D&H Gravity Railroad were made at the West Point Foundry.

Manhattan facilities were on leased land and were basically for assembly.

The vertical boiler of the *Best Friend* was most likely made in Manhattan, though the downstate operation was for small castings. There were most likely no large scale castings in Manhattan, as there was no molding house. Structures included a millwright shop, blacksmith shop, engine house, pattern shop, machine shop, and office, plus a boat dock for supplies and transshipments. The Manhattan operation primarily produced stationary steam engines, rather than being a locomotive erecting shop, and thus there would have been no trackage. West Point Foundry advertised the "manufacture" on short notice of machines of every description, such as "church bells and brass castings", cannon, shot shells, millwork, pipes, calendar rollers, rolling and slitting mill rollers, and cotton and other small machinery cast from the cupola". An 1829 ad announced:

"The Proprietors of the West Point Foundry, have in addition to their works in Putnam County, established an extensive Steam-Engine Factory on Beach Street, New York, and are prepared to manufacture on short notice, Machinery of every description, viz. Steam Engines, Wrought Iron or Copper Steam Boilers, Tanks, Sugar Boilers, Water Presses, Cotton Screw Presses with double reversed threads, [and] Paper Mill Screws".

However, it appears that most of these items would have been molded at Cold Spring and sent to Manhattan on West Point's ships (remember, there was not yet a railroad along the Hudson). The foundry site also acted as a transshipment site between Cold Spring and the DuPont powder works in Wilmington. Kemble sold the DuPonts machinery and acted as their agent for gunpowder. Locomotive building was not primary and thus not successful.

The Manhattan facility was consolidated with Cold Spring in 1840 and the site had other uses. West Point moved more into the area of armaments and manufactured arms, especially the Parrott Gun (long-ranged rifled cannon) for the Civil War. Robert Parker Parrott became Superintendent of the Cold Spring works and eventu-

“The West Point Foundry terminated all operations in 1884.”

ally bought out the Kembles. The West Point Foundry terminated all operations in 1884.

The city site has been demolished and is part of the Shearson Lehman/American Express development in lower Manhattan. In Cold Spring, the foundry administration building is crumbling, and all that is left of the rest of the complex are foundations. There is an extensive display however, at the Foundry School (also built by Kemble), which has been turned into a museum by the Putnam County Historical Society. It is open Wednesday through Sunday from 11 am to 5 pm and is located on Route 9D just south of Cold Spring, and very near the restored Boscobel. The village of Cold Spring is in a delightful part of the Hudson Highlands Region, combining beauty with history.

Information supplied by Putnam County Historical Society, with a reprint of "Archaeological Investigation of Site I of the Washington Street Urban Renewal Area, New York City". Prepared for Shearson Lehman/American Express through NYC Public Development Corporation by the Cultural Resource Group, Louis Berger & Associates, September, 1987.

The engines

Now let's consider the eleven engines that were assembled by West Point Foundry in New York City from parts cast in Cold Spring. The five most notable were:

Best Friend of Charleston: Built in 1830 for $4,000 and shipped to Charleston, SC aboard the ship "Niagara". Although its 4-wheel drivers generated only six horsepower, it hauled both coaches and freight on America's first regularly scheduled steam railroad, the South Carolina Canal and Railroad Company, which operated about 140 miles from the Port of Charleston to a location just opposite Augusta, GA on the Savannah River.

This engine, with its vertical boiler, met its premature end when the fireman, annoyed by the hissing steam safety valve, tied it down; the boiler and engine exploded. Salvaged parts were later rebuilt into the appropriately-named *Phoenix*. The successor Southern Railway much later built a replica of the *Best Friend*.

John Jervis designed the *DeWitt Clinton,* which went into service in 1831.

The Experiment / Brother Jonathan also designed by John Jervis.

West Point: This second engine (1831) also went to the SCC&RR. It is significant to note that it was the first engine with a horizontal boiler.

South Carolina: In 1832, this first articulated locomotive also traveled south. However, it proved to be an "impractical freak" and spent most of its time in the repair shops.

Dewitt Clinton: John Jervis had served as Chief Engineer to the D&H operation noted above, and later moved over to the budding Mohawk & Hudson Railroad. He designed this engine, which went into service in 1831 as the first steam locomotive in New York State. It had been constructed to burn anthracite coal, but the blower mechanism was not operating properly, so pitch-pine was substituted. The resulting inaugural run showered the first patrons with soot and sparks that burned up the umbrellas. In addition, the ride behind in the converted stagecoaches was anything but smooth, with lurches and bangs, as this was well before the days of air brakes. The *Dewitt Clinton* produced about 10 horsepower. A replica commissioned by the New York Central is now in the Henry Ford Museum in Dearborn, Mich.

The *Experiment / Brother Jonathan*: Jervis then designed a prototype engine that was a 4-2-0 with 4-wheeled front truck (or bogy), which served as early pilot wheels, allowing curves to be taken better. This Mohawk & Hudson engine performed very well, in fact much better than the standard English engines then in service around the U.S. The innovative pilot trucks became the accepted design for future steam engines.

In 1832, David Matthews (who had supervised the construction) ran the *Experiment* over the Mohawk & Hudson's 14 miles in 13 minutes (with one water stop!), thus posting an overall speed of 65 mph. It was thus the first mile-a-minute run in history. Matthews also claimed to have covered one mile in 45 seconds, which would have posted an unofficial speed of 80 mph.

However, the West Point Foundry did not continue in the locomotive business despite the significance of these five engines within roughly a 5-year period.

Above information largely incorporated from "Early American Steam Locomotives" by Reed Kinert.

And in New Jersey

Now let's turn our attention to later

"Paterson can boast of being one of the premier American locomotive manufacturing centers in the last half of the 19th century."

locomotive building across the river in Paterson, N.J. Paterson can boast of being one of the premier American locomotive manufacturing centers in the last half of the 19th century. Alexander Hamilton is given credit for developing this first planned American industrial center, utilizing the massive waterpower generated by the Great Falls of the Passaic River, which cascade 77 feet (280 feet wide) in Paterson.

After a visit to the falls in 1788 with Generals Washington and Lafayette, Hamilton founded in 1791 the "Society for the Establishment of Usefull Manufactures", or S.U.M., and commissioned Pierre L'Enfant (who also designed Washington, DC) to create a design to harness this waterpower. Peter Colt actually designed a three-tiered raceway channeling the water down through the many industrial plants that located there. Later, in 1914, a hydroelectric power plant was built at the foot of the falls; it is currently being restored to use.

Among the industries were textiles, jute, linen, and silk mills (Paterson is still the silk capital of the U.S.), paper mills, steam locomotives, Colt revolvers, Holland submarines and later, Wright aircraft engines.

S.U.M. continued right up to 1945, when it was dissolved and its assets were acquired by the city. The period of decline continued, and in the mid-1960s the historic plants were threatened with demolition for a highway. Fortunately, preservationists and city officials worked to create the Great Falls/S.U.M. National Historic Landmark District, which was dedicated by President Ford in 1976. Some restoration work has been performed, but much remains, although there are gradual efforts by community preservation organizations. Perhaps it could become another Lowell, Mass.

"Paterson's attraction, though, is centered in the 4-story Rogers Locomotive Erecting Shop that was built in 1871."

Paterson's attraction, though, is centered in the 4-story Rogers Locomotive Erecting Shop that was built in 1871. It now houses the Paterson Museum on the ground floor, and then has offices on the upper floors. The brickwork and massive wooden doors have been lovingly preserved. Below ground level, the bays may be visited upon appointment. Outside the building is engine 299, a 2-6-0 built by Cooke in 1906, which worked for the Panama RR (don't confuse it with the Pennsy!), and was recently brought home. It has been joined by #1, a 0-4-0T (also Cooke, 1910) that came from American Brake Shoe in Pennsylvania. Neither,

though, is too well preserved. Efforts to acquire a Rogers locomotive have been frustrated to date.

Directly across Spruce Street from the Erecting Shop are other Rogers plants, now silk, jute, and textile mills, including the Administration Building (1881), Frame Fitting Shop (1881), Millwright Shop with an unusual "L" shape (1879), and Workshop (1881). Across Market Street from the Rogers plants is a large parking lot where the Cooke and Grant plant formerly stood; the bays have been paved over. The remaining Cooke buildings are the foundry (1875) and administration building (1881) on Jersey Street. The relocated Cooke plant is still standing about a mile from this area. Adjacent to the Rogers plant is an old interurban car barn (about 1910) now used by NJT buses.

Who was Rogers?

Thomas Rogers had been involved in the textile manufacturing business. In 1835, he switched to steam engines and built the *Sandusky*. Other notable Rogers engines included #119 and the *General* of Civil War fame. The rival *Texas* was also Paterson-built, but by Danforth, Cooke & Co. As his plant was about a mile from the nearest railroad (DL&W), Rogers was forced to load the finished engines either on a sled-like device or flatbed wagons, and then pull them by teams of horses or mules right through downtown Paterson to the tracks. From 1837 through 1913, Rogers built 7,274 engines in this plant. This was considered to be about one-third of all the engines built in the USA during the period. He was joined by the following other Paterson engine builders:

Cooke (incl. Danforth)	1853-1926	5,544
Grant Locomotive Works	1848-1890	1,800
William Swinburne	1851-1858	120
Theodore Scheffler	1876	7
Todd & Rafferty	1860s	3
Phoenix Loco./Machine	1860s	unk.

In addition, the Leslie Brothers constructed 64 rotary railroad snowblowers in Paterson between 1887 and 1903 (actually, the vast majority was built by Cooke). One of the surviving ones was Conrail #60021 (1889) housed at Selkirk. A competitor, Jull's "Centrifugal Snow Excavators" were built under contract by Rogers (about 10). For a very good article on Leslie and Jull, see Paul Swanson's story

continued on page 46

Thomas Rogers began to make steam engines in 1835.

RE: Moving finished engines on sled-like devices or flatbed wagons. The Dickson Locomotive Works in Scranton also moved finished engines on sled-like devices or flatbed wagons.

RE: Grant Locomotive Works; and Cooke (incl. Danforth) locomotive works in Patterson, NJ.

D&H engine No. 3 (*Honesdale)* was built in 1861 by W. Cooke & Co. in Scranton. In Volume XV in this D&H series, p. 19, we read:

". . . **Honesdale:** D&H Engine No. 3, 0-4-0, Gravity gauge, 4-wheel switcher, re-named "Terrapin". Built in 1861 by W. Cooke & Co., Scranton, retired 1899; name changed to "Col. Ellsworth," soon after that brave officer's assassination in Alexandria, VA. This engine was next called the "Fire Plume". As it was too small for the work at Olyphant, it was kept there only a short time, and then did duty on the company's docks in Honesdale under the name *Honesdale."*

One wonders if there was any connection between W. Cooke & Co., Scranton, and the Cooke (incl. Danforth) locomotive works in Patterson, NJ?

ALCo gradually took over many of the Paterson operations.

"... the glory days of the late 1880s when Paterson could lay claim to being America's locomotive building capital."

in the January 1987 issue of **Trains** magazine.

Thus, a grand total of 14,812 locomotives and related products were constructed in Paterson from the 1830s through the mid-1920s.

Rogers had resisted overtures by Alco to take over his plant. But Alco gradually took over many of the Paterson operations, including Rogers and Cooke, plus the Leslie "snow blowers", which continued to be built by Cooke, and work was transferred to Schenectady and other places. Paterson's rather cramped buildings and distance from rails prevented many larger locomotives from being constructed. It may still be a somewhat depressed industrial city, but it is great to visit the Rogers Erecting Shop and visualize the glory days of the late 1800s, when Paterson could lay claim to being America's locomotive building capital.

The Rogers Erecting Shop can be reached from I-80, exit 57B, and then following signs for the "Great Falls".

Currently

In 2011, a discussion started about how to preserve the natural and historical features of the Paterson Great Falls National Historical Park. On one hand, the natural landscape could be stressed, with recreational opportunities such as a 2.5-acre stretch of shoreline, to be called the Great Lawn. There could be an amphitheater for outdoor performances and other activities. Capital costs would be $32 million to enhance the natural landscape.

On the other hand, some $46 million would be required to preserve and upgrade the industrial and historical structures. This would create a "destination for experiencing the continuum of industrial uses", including upgrading the raceway that brought water into the industrial plants. Some of these could be preserved with interpretive programs, such as at the Colt Gun Mill.

The current Broadway smash hit "Hamilton" has brought new interest to Hamilton and the industrial center he inspired. "Paterson had an outsize influence on American manufacturing for a very long period of time", said Darren Boch, Superintendent of Paterson Great Falls National Historical Park. "Most New Yorkers in the 1800s would have known where Paterson was and why it was important".

The above was written in 1987 and 1988. The material in those articles is still pertinent and accurate, so I am reproducing it. Much of the manufacturing data was provided by Rob Dubits.

Such, then, were the “mobile” steam locomotives in America at the time the *Stourbridge Lion* made its trial run in Honesdale in 1829.

What about stationary steam engines in America at that time?

In 193l, N. N. Hiller, Jr. wrote an article titled "Up Hill and Down Dale by Gravity Rail" that was published in *The Delaware and Hudson Company Bulletin,* June 15, 1931, p. 181-182, 188-189.

In Volume II, p. 37, in this series we report a summary description of the revisions to the Gravity Railroad for 1845 that were reported by N. H. Hiller, as follows:

"In 1847, the use of steam had become more or less general and the company found that it would be better to equip its planes with steam engines and remove the faithful water wheels. They therefore let bids out to the Novelty Iron Works, the West Point Foundry, and to the Berdens Foundry Company for steam engines and boilers and their installation. In order to regulate better the flow of traffic over the system, the turnouts were abolished and double tracks were established everywhere on the planes. At this time, also, the 'T' rail was installed, the rails until then having been ordinary strap . . . The adoption of the 'T' rail gave much greater strength to the roadbed and heavier loads were inaugurated. The same gauge was retained." ("Up Hill and Down Dale by Gravity Rail" by N. N. Hiller, Jr. *(The Delaware and Hudson Company Bulletin,* June 15, 1931, p. 181-182, 188-189)

Hiller apparently believed, incorrectly, that Planes Nos. 1-5 on the Gravity Railroad in the 1829 configuration all had water wheels at the heads of the planes. He says: "In 1847, the use of steam had become more or less general and the company found that it would be better to equip its planes with steam engines and remove the faithful water wheels.” None of the planes in the 1829 configuration of the Gravity Railroad had a water wheel as a power source in 1829. Stationary steam engines were at the heads of Planes Nos. 1-5 when the railroad opened in 1829.

Hiller apparently also believed, incorrectly, as well, that the strap rails that were installed in the Gravity system in 1829 were all replaced with T-rails in 1847. He says: “At this time [1847], also, the 'T' rail was installed, the rails until then having been ordinary strap . . . The adoption of the 'T' rail gave much greater strength to the roadbed and heavier loads were inaugurated.” Not true. T-rails were not installed on the Gravity system until 1858.

In that same article Hiller also says that when the Delaware and Hudson Canal Company “found that it would be better to equip its planes with steam engines and remove the faithful water wheels” that they “let bids out to the Novelty Iron Works, the West Point Foundry, and to the Berdens Foundry Company for steam engines and boilers and their installation.”

Hiller is the only writer on the history of the Delaware and Hudson Canal Company who names those three companies as the possible source for the stationary steam engines that were installed in the 1829 configuration of the Gravity Railroad (not in 1847 as Hiller erroneously believed).

It is understandable that Hiller would mention the West Point Foundry (in New York City at the corner of Beach and West Streets in lower Manhattan, and in Cold Spring, NY, across the Hudson River from West Point at Wyantskill Creek in Troy, NY) because of that foundry's role in the reception and setting up in 1829 of no less than two of the engines that the D&H imported from England for use on the Gravity Railroad.

But what about the other two companies named by Hiller as possible manufacturers of the stationary steam engines that the D&H needed, (1) the Novelty Iron Works (located at the foot of 12th Street, at the East River, in New York), and (2) the Burden Iron Works (not "Berdens Foundry Company" as given by Hiller; located on the Hudson River at Wynantskill Creek in Troy, New York)? Why did Hiller name those two companies? We may never know the answer to that question.

Having studied the history of those three companies, however, we believe that only the West Point Foundry could have produced the stationary steam engines that the D&H needed in 1829 for its Gravity Railroad.

The working relationship between the West Point Foundry and the D&H was well established in 1829, when the D&H would have been in the market for stationary steam engines for its Gravity Railroad. Significantly, Lowe states: "The Manhattan operation [of the West Point Foundry] primarily produced stationary steam engines, rather than being a locomotive erecting shop. . .."

In addition, as we read in the Lowe article, "West Point Foundry advertised the 'manufacture' on short notice of machines of every description, such as 'church bells and brass castings', cannon, shot shells, millwork, pipes, calendar rollers, rolling and slotting mill rollers, and cotton and other small machinery cast from the cupola."

In addition, an 1829 ad from the West Point Foundry announced:

> "The Proprietors of the West Point Foundry, have in addition to their works in Putnam County, established an extensive Steam-Engine Factory on Beach Street, New York, and are prepared to manufacture on short notice, Machinery of every description, viz. Steam Engines, Wrought Iron or Copper Steam Boilers, Tanks, Sugar Boilers, Water Presses, Cotton Screw Presses with double reversed threads, [and] Paper Mill Screws".

The five stationary steam engines that the D&H needed to open its Gravity Railroad on October 9, 1829 were purchased by the D&H, there can be little doubt, from the West Point Foundry, either in Cold Spring, NY, or in New York City. As such, it would have been a simple matter to ship them to Honesdale via the D&H Canal, which opened on October 16, 1828.

Who ran these first five stationary steam engines for the D&H? From *Durfee,* we learn that it was William Ball who was in charge of the five stationary steam engines when the Gravity Railroad opened in 1829. We also learn, from *Durfee,* that William Ball, Chief Engineer "was engaged from one of the shops in New York on the first starting of the works, when quite young, to take charge of the five engines on the line."Here is what *Durfee* says:

"On the line of engines up the mountain, William Ball was Chief Engineer. He was engaged from one of the shops in New York on the first starting of the works, when quite young, to take charge of the five engines on the line. He declined coming until the Company gave him a bond of agreement to keep him in their employ six months. He remained in their employ his lifetime, between thirty and forty years, beloved and respected by all who knew him. Those in his employ were, at No. 1 Whitman Brown, who remained for a number of years, and then went to Honesdale, where he was killed by the cars. At No. 2 was James Johnson, who removed to Keokuk, where he died. He was assisted at No. 2 by Joseph Gillespie, who died at Providence a few months ago. *[Durfee* was published in 1875.] Afterwards by Patrick Archbald, who went to Michigan. They were succeeded by P. R. Farrer, who died there. No. 3 was run a number of years by John Davis, whose sons succeeded him and followed in the same line of business. No. 4 was run forty years ago by Peter Campbell; afterwards by James Cookson, and later by Mr. Ball, brother of William Ball. By a misstep he slipped into the machinery and in a moment was a mangled corpse. Orlando Foster, formerly from this neighborhood, ran No. 5 for a long number of years, and was, I believe, succeeded by one of his sons, all of whom are engineers. So it is that Mr. Archbald and all that line of skilful, energetic men have passed away and given place to others, with new and much improved machinery. The first engines were run by or with walking

beams and heavy balance or fly wheels. The engineer had to use the starting bar every time the machinery was set in motion." *(Reminiscences of Carbondale, Dundaff, and Providence Forty Years Past* by J. R. Durfee. Philadelphia, Miller's Bible Publishing House, 1875, pp. 18-19)

P. C. Gritman's wife, nee Jane Ball, was the daughter of William Ball, who, together with 5 others, was brought to Carbondale from New York by the D&H to install and run the stationary steam engines in the 1829 configuration of the Gravity Railroad.

In the obituary of Orlando Foster that was published in the *Carbondale Advance* (April 6, 1872, p. 3), we read: ". . . Thus has passed away the last of the early engineers on the Mountain section of the Del. & Hud. C. Co.'s Railroad—of those in service in the year 1837, the date when our residence in Carbondale commenced. They were a body of capable and intelligent men, embracing, we believe, <u>Gritman Brown at No.1, James Johnson at No.2, John C. Davis at No. 3, Peter Campbell at No. 4, and Orlando Foster at No. 5.</u> [emphasis added] These embraced all the steam engines to haul the coal to the summit of the Mountain. Wm. Ball, esq. resident at No. 1, was then and for many years after Superintendent of all the engines. The positions held by these engineers were considered very honorable and lucrative, the best in the Company's gift below Superintendents. Of the men then Superintendents few survive, and none are now resident here. James Archbald, esq., who died at Scranton about two years since, greatly lamented, had general charge, James Clarkson, esq., now residing in Benton, was Superintendent of the Mines, John H. McAlpine, Superintendent of the Machine Shop, (but he soon after resigned and was succeed by James Dickson, esq.,) and R. E. Marvine, esq., now resident at Green Ridge, was Accountant and Pay master. Everything was then new, and all departments managed with great energy and economy. The operations were on a comparatively small scale. From 300,000 to 400,000 tons of coal was considered a fair annual product. But it was in those days that the solid foundations were laid for the immense expansion that has since taken place, and those gigantic enterprises which now make the Del. & Hud. C. Co. the object of admiration, and its stupendous achievements one of the wonders of the age. / The men that thus laid deep the foundations for these great results, have nearly all completed their earth-work, and left to others their positions and responsibilities." *(Carbondale Advance*, April 6, 1872, p. 3). The complete obituary of Orlando Foster is given in the section on Plane No. 5 in the unit on the 1845 configuration of the D&H Gravity Railroad.

That these first engineers at the heads of the planes when the Gravity Railroad opened in 1829 were brought here from New York City is confirmed by a statement in the obituary of Jane Ball (born February 18, 1833, died February 24, 1909), daughter of William Ball and Mary Ann Smith. Therein we read:

"Jane Ball was the daughter of William Ball and Mary Ann Smith. "Her father came here [Carbondale] from New York city with five other young men to erect the first engines on the gravity road. [He was the first engineer on Plane No. 1 when the Gravity Railroad opened on October 9 1829.] He was the only one of the party to settle here permanently in the employ of the D. & H. and was soon given charge as master mechanic of all the stationary engines on this side of the mountain. [For many years, William Ball was the superintendent of motive power and the first master mechanic of the D. &H. Gravity Railroad.] Her [Jane Ball] grandparents were Captain Charles and Ruth Godfrey Smith. The former had charge of portions of the D. & H. work here for many years and built a section of the D. & H. canal before coming to Carbondale." ("Death of Mrs. P. C. Gritman Is Sad Loss to Community," *Carbondale Leader*, February 24, 1909). This important clipping is to be found in one of the Gritman scrapbooks, about which more will be said later in this volume.

I shouldn't wonder if the shop in New York City in which William Ball was working when he was recruited by the D&H to come to Carbondale and take charge of the five engines on the Gravity Railroad (see Durfee statement above) was the West Point Foundry. He would have been an excellent choice: Hire a young man who helped build the stationary engines to be in charge of those engines when installed on the Gravity Railroad. That's exactly the kind of management decision that the D&H made over and over again in the nineteenth and twentieth centuries. Get the best people involved. To do otherwise, is bad management.

We may never know for certain if the five stationary steam engines in the 1829 configuration of the Gravity Railroad were made by the West Point Foundry, but it is our contention that they were. We may never know for certain if William Ball worked for the West Point Foundry and was recruited to come to Carbondale and supervise the running of those five engines, but it is our contention that he did.

Whatever the case, when the line opened on October 9, 1829, at the heads of Planes Nos. 1-5 were stationary steam engines that were not made in Carbondale or the Lackawanna Valley but were probably made in New York City, and those engines were run under the supervision of William Ball who was brought here by the D&H from New York City "from one of the shops in New York City."

1903

Stourbridge Lion, 1828-2017, Annotated Chronology

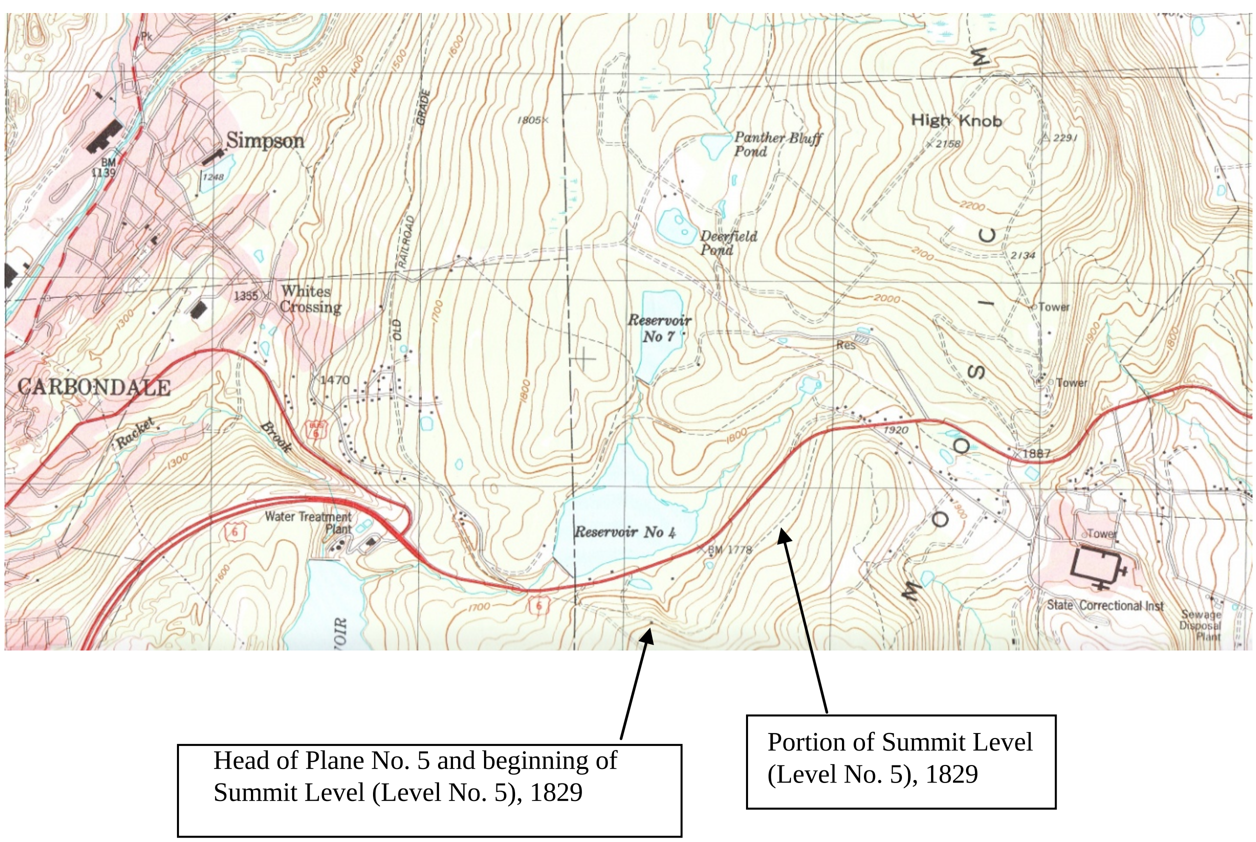
What were the projected steam locomotive needs of the D&H in order to open its Gravity Railroad? We read the following in *Torrey* (1882):

"It was originally expected to make use of locomotive power on the three long levels, known as 'summit level,' 'six mile level,' and 'four mile level,' and to use horses on the other levels between the planes. . . "

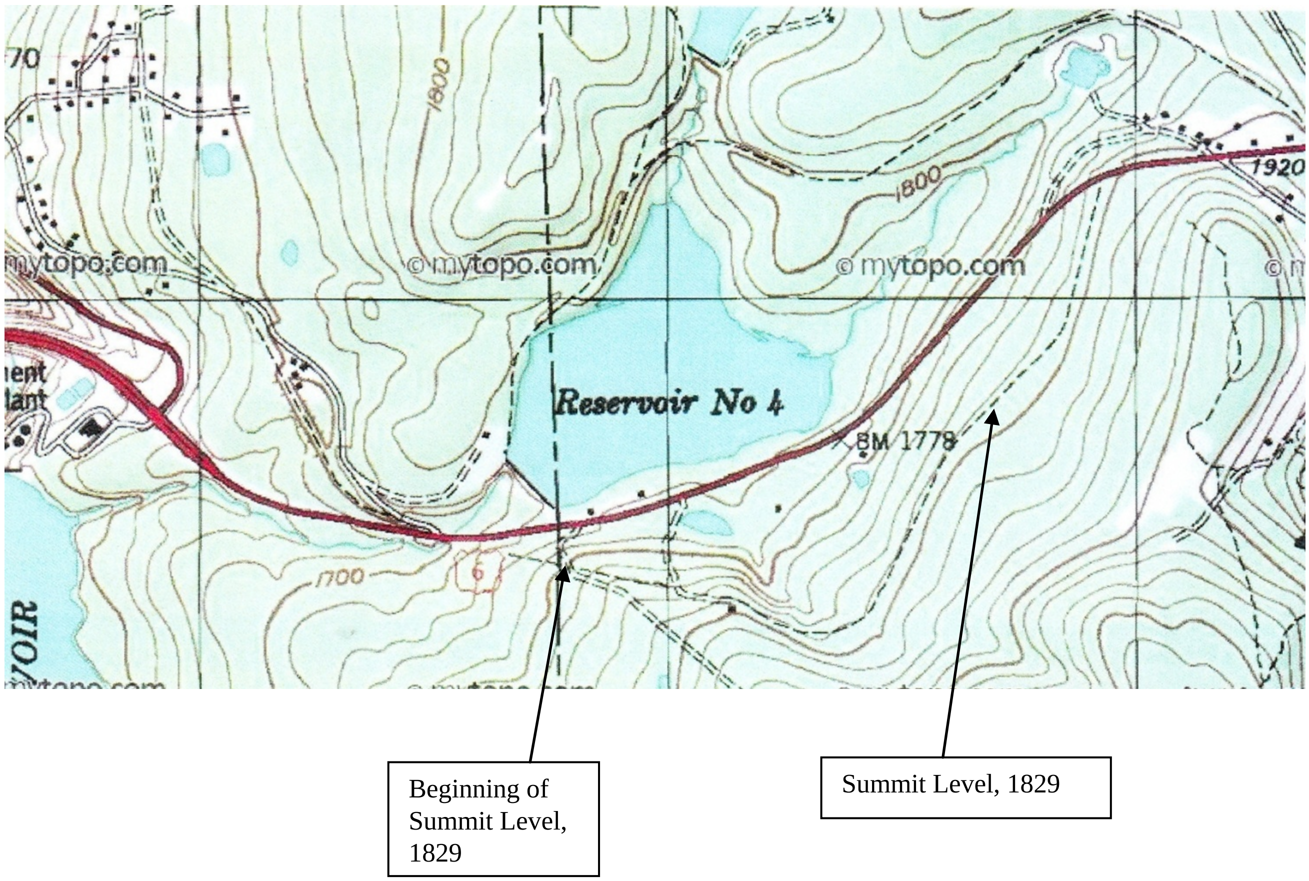
The three locations on the 1829 Gravity Railroad where it was planned to use steam locomotives as motive power are:

1. One engine for Level No. 5 (the Summit Level) on Plane No. 5:

We see a portion of that level on the USGS topographical map of Waymart, PA, 1999, that is given below:



Another detail, from closer in, of this same area, showing the 1829 Summit Level:



2. One engine for the Six-mile Level:

Six-mile Level (Level 2): from Waymart to Prompton:

“From the foot of No. 7 was the long, or ‘six-mile level’, descending 264 feet, or 44 feet in a mile, to the head of plane No. 8, at Prompton. / The route of the present [1882] track for loaded cars, from the middle of plane No. 6 to the head of No. 8, at Prompton, is very nearly on the same ground as the original road, and with the exception of the part between the D. Blandin place and the canal basin, is the only part which is on the original route.” *(Torrey*, 1882)

The cars were allowed to descend the six-mile level by gravity, and their speed had to be controlled. Various schemes were tried, amongst them being an elaborate windmill affair, connected to the axles by ropes or belts and retarding the speed by friction. This idea was soon discarded and a simple brake using the pressure of a bent sapling applied directly on the wheels came into general use.

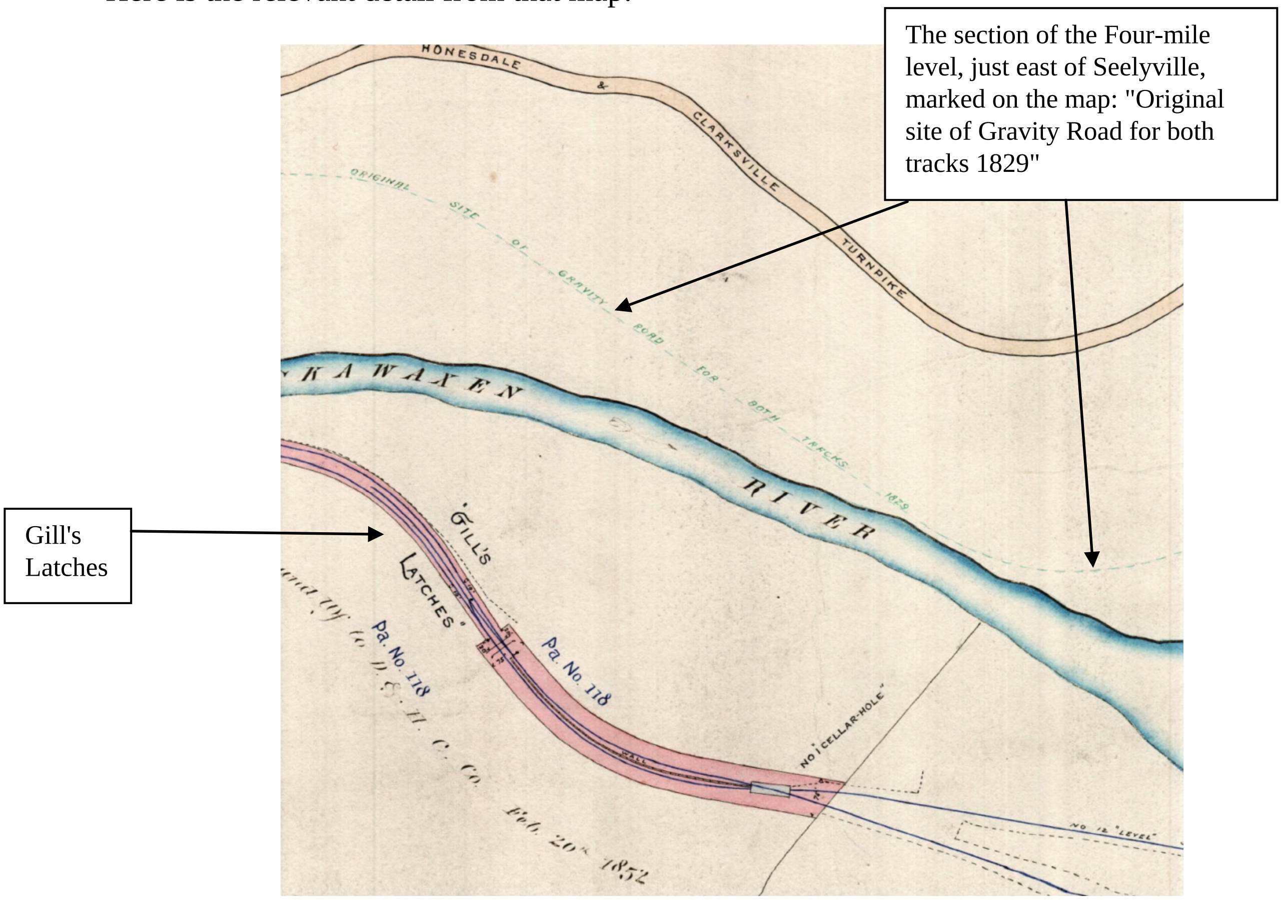
3. One engine for the Four-mile Level: from the foot of Plane No. 8 to Honesdale:

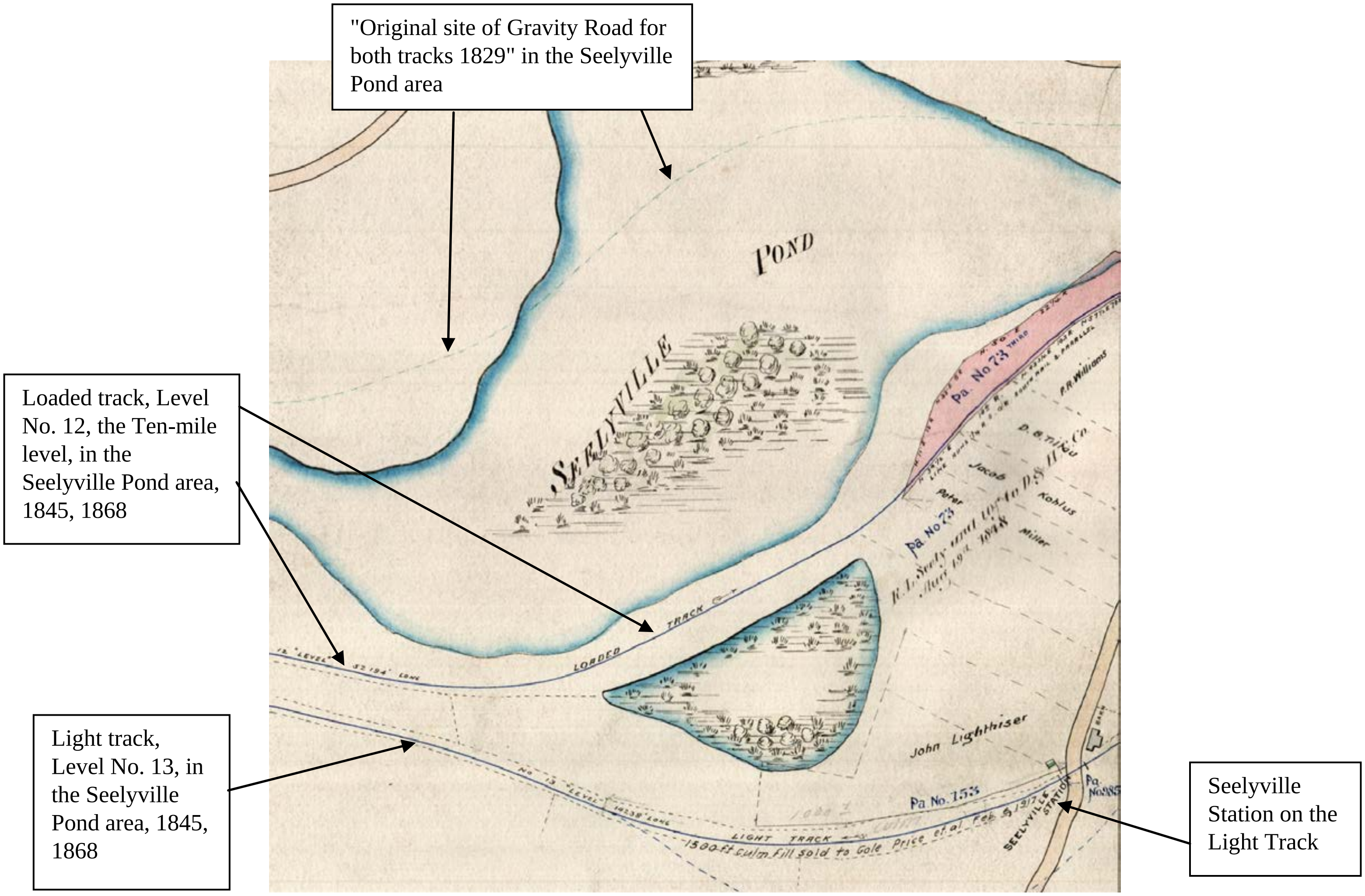
Four-mile Level (Level 3)

"From the foot of plane 8 was the 'four-mile level' extending to the canal basis in Honesdale, and descending 106 feet, or twenty-six and one-half feet per mile. / The track was constructed along, and near to, the northern, or left, bank of the west branch of the Lackawaxen, passing through what is now the Seelyville mill pond, along the northern side of, and very near to Seely's saw mill, and the Fosters' tannery buildings—and close along the river side of the turnpike across the Blandin flat, and from there to the basin near the site of the present track. / Near the Seely mansion at Seelyville the track passed under a bridge where the road to Cherry Ridge crossed it. This bridge was the point to which Horatio Allen run [sic] the *Stourbridge Lion* in his famous experiment on Aug. 8, 1829, the bridge being too low to permit the locomotive to pass under it." *(Torrey,* 1882)

In the 1895 Gravity Railroad map volume, we see that the tracks on the four-mile level passed through a portion of Seelyville Pond.

Here is the relevant detail from that map:




"Original site of Gravity Road for both tracks 1829" in the Seelyville Pond area
Loaded track, Level No. 12, the Ten-mile level, in the Seelyville Pond area, 1845, 1868
Light track, Level No. 13, in the Seelyville Pond area, 1845, 1868
Seelyville Station on the Light Track
SEELYVILLE
POND
LOADED TRACK
LIGHT TRACK
Pa. No 73
Pa. No. 153
John Lighthiser
P.R. Williams
Jacob
Peter
Kohlus
Miller
SEELYVILLE STATION

Three long levels, three steam locomotives:

With the failure of the *Stourbridge Lion* on August 8, 1829, the Delaware and Hudson Canal Company decided not to use steam locomotives on those level, but to use horses instead. In Torrey (1882) we read:

“It was originally expected to make use of locomotive power on the three long levels, known as ‘summit level,’ ‘six mile level,’ and ‘four mile level,’ and to use horses on the other levels between the planes. / <u>Three locomotives were made for the company in England under directions of Horatio Allen, and brought to New York to be so used, but on the trial of one of them, the track was found too weak to admit of their use with safety; and the use of horses was thus made necessary on those levels also</u> [emphasis added]. / On the summit level one horse could not draw more than two loaded cars at a time. On the six mile level, between Waymart and Prompton, the grade was such that loaded cars descended by gravity, and cars were provided with a sufficient number of horses to ride with each train to draw the empty cars back—one horse being thus able to return four empty cars. These horses became so accustomed to riding down the grade that when, by reason of ice on the rails, the cars required force to propel them, some of the horses clearly showed an unwillingness to go upon the track and draw the cars in that direction. / On the four mile level, between Prompton and the canal basin, the grade was such that one horse could draw five loaded cars down, and the same number of empty cars back. / The four-mile and the six mile levels had each a branch or side track for a short distance, near the centre, so that cars moving in one direction could pass those going in the opposite direction, and at these branches were the boarding-houses for the car runners. One of these boarding houses was near the present residence of Jacob L. Keen, and was kept by Warren Dimock, and the other was opposite the present residence of Henry L. Phillips, and was kept by George M. Keen.” *(Torrey,* 1882)

In the archives of the Pike County Historical Society at Milford, PA, we discovered, on September 20, 2103, eleven blueprints showing line drawings of 1829 Gravity Railroad rolling stock or trackage or features of the D&H Canal and its locks. All of these blueprints were created, it appears, at the time that E. D. LeRoy wrote *The Delaware & Hudson Canal and It's[sic] Gravity Railroads,* which was published by the Wayne County Historical Society in 1980.

In the lower right-hand corner of these blueprints, we read: "EX LIBRIS / E. D. LeRoy," followed by a number. The numbers appear to indicate a number in a sequence of blueprints which E. D. LeRoy apparently had produced of old documents relating to the D&H Canal Company. It appears that he had these blueprints created as a way of preserving fragile old documents about the D&H. One can not help but wonder if those fragile old documents still exist.

Here is a summary description of those eleven blueprints:

1. #17 paddle gate irons for locks on D & H canal

2. #221 Gilson's locks: survey by Lord, Butler, April 1854

3. #223 Baisden's lock (with #225 on the same blueprint): survey by Lord, Butler, April 1854

4. #224 Ridgeway's locks: survey by Lord, Butler, April 1854

5. #225 Pool-Pit Basin [at the Narrows of the Lackawaxen River]

6. #264 roll ways

7. #265 dry wall lock with timber and plank facing

8. #266 light rail road wagons for mules and horses

9. #267 coal waggons

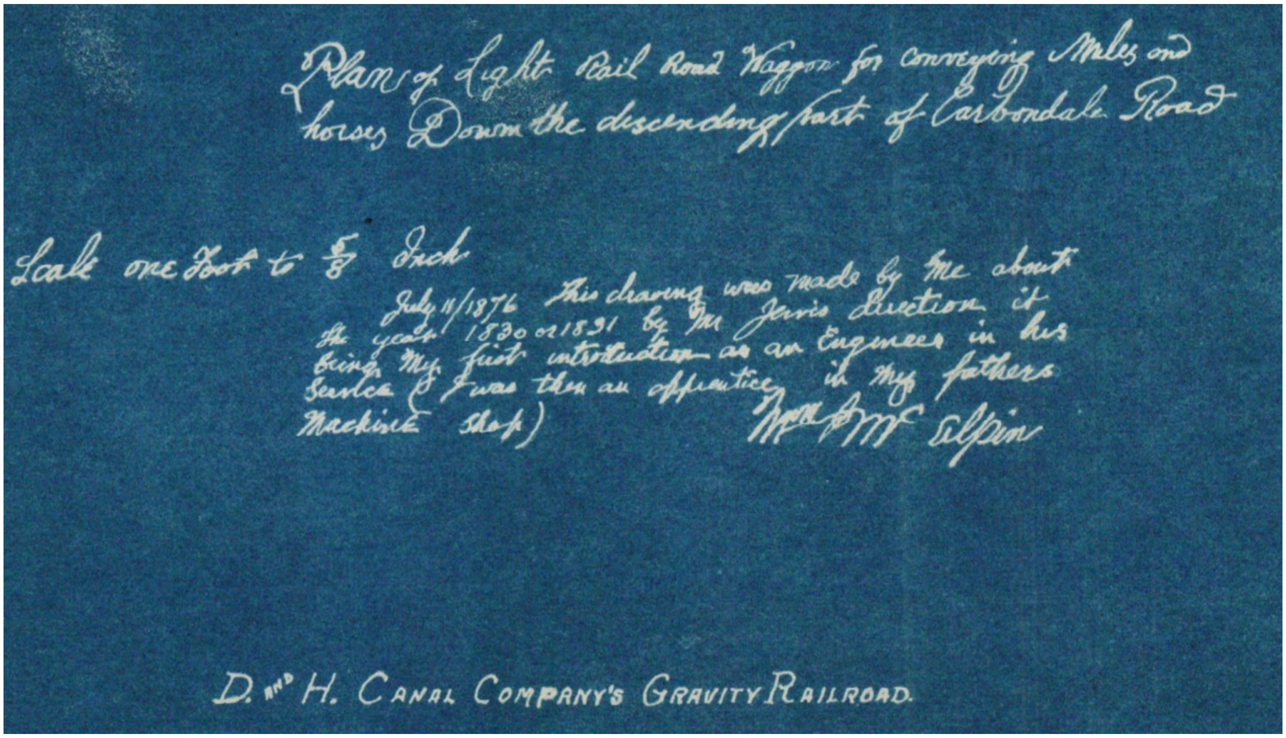
10. #268 mitre sill and gate recesses for locks; re-drawn from original plans of 1827

11. No number lock gates for the Delaware & Hudson Canal, upper and lower gates, type used 1827-1850

How many blueprints were produced? It appears that there were no less than 268. There are eleven in the Pike County Historical Society archives. If there were others, do they still exist?

One of those blueprints, numbered 266, shows three line drawings of "Plan of Light Rail Road Waggons for conveying Mules and horses Down the descending part of Carbondale Road."

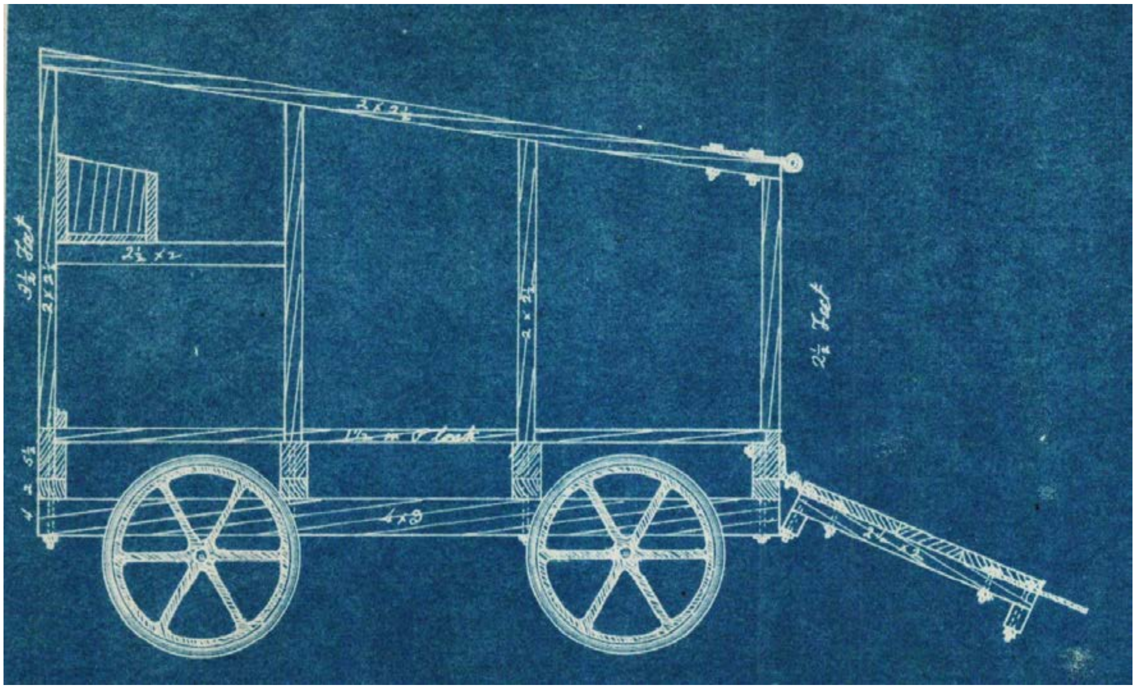
A scan of the note on this blueprint ("Scale one Foot to 5/8 Inch") is given below:

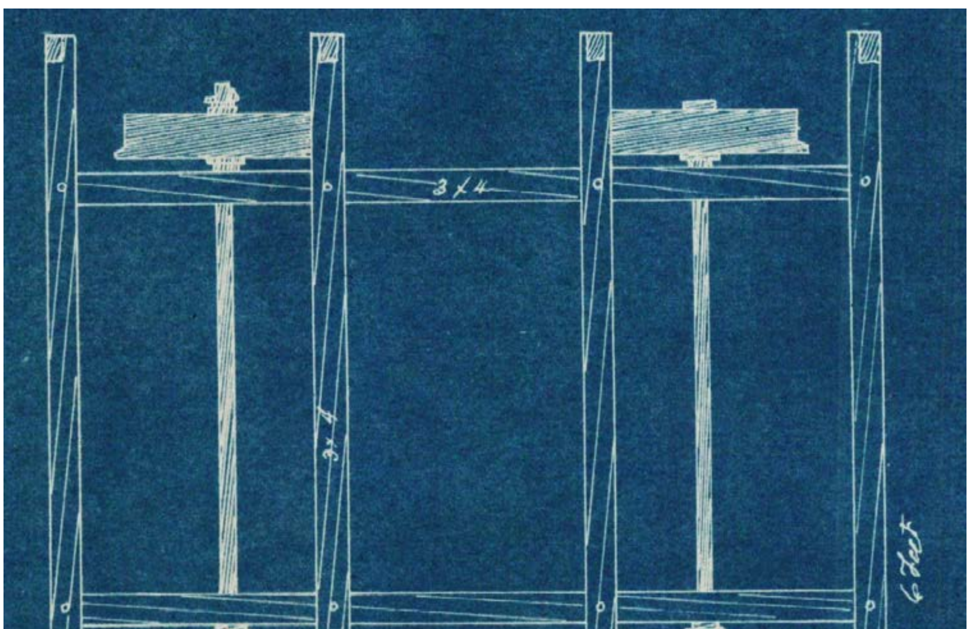


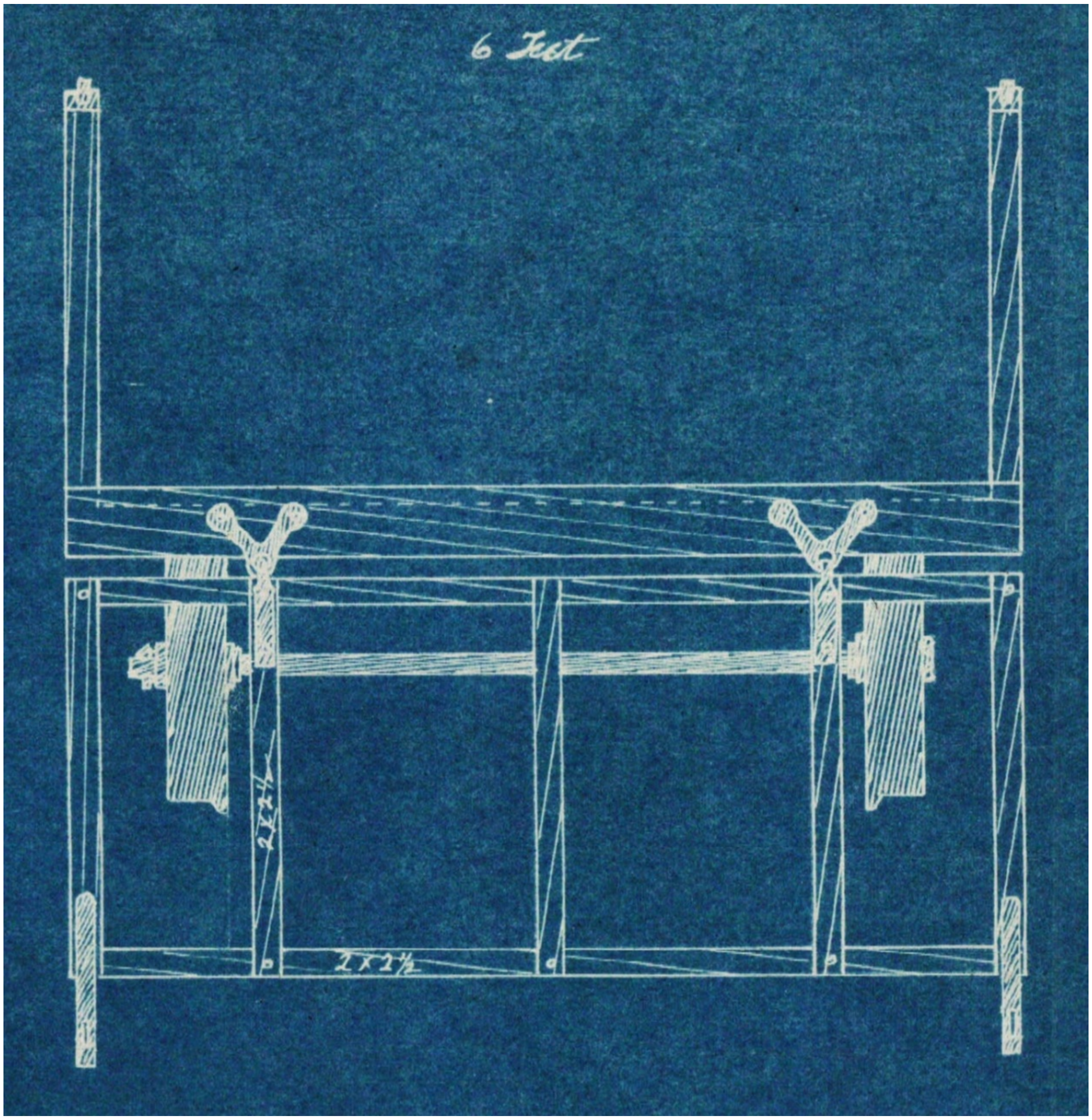
On the original drawing of this plan for the horse and mule cars used on the six-mile level William Jervis McAlpin wrote (see above blue print), on July 11, 1876 the following:

"July 11 / 1876 This drawing was made by me about
The year 1830 or 1831 by Mr. Jervis direction it
Being My first introduction as an Engineer in his
Service (I was then an apprentice in My fathers
Machine Shop) Wm J McAlpin"

Here are the three line drawings by William J. McAlpin for the railroad wagons for horses and mules on the Six-mile Level:


3½ Feet
2½ x 2
2½ Feet


3 x 4
6 Feet
7 Feet



Much has been written about the *Stourbridge Lion* and the other engines that the D&H imported from England in the 1820s for use on its Gravity Railroad. All historians are not in agreement, however, about (1) the number of engines imported by the D&H at that time, and (2) the names of those engines.

Some historians maintain that Horatio Allen ordered/purchased three engines for the D&H; others maintain that he ordered/purchased four. The primary spokesperson for the three-engine school of thought is Horatio Allen who, in the 1880s said that he ordered/purchased three. The primary spokesperson for the four-engine school of thought is the D&H.

Throughout the nineteenth century, and up to the publication of *Century of Progress* in 1923, the generally accepted position was that Horatio Allen ordered/purchased three engines during his trip to England. Beginning with the publication of the D&H's official history of itself, *Century of Progress*, in 1923, the four-engine position emerged, and virtually all D&H historians after 1923 have adopted the four-engine position advanced by the D&H in 1923.

The names of those engines (whether there were three or four) is also an area where there is disagreement among historians.

In the course of this study, we will look carefully at both positions. We will do so by moving through the nineteenth and twentieth centuries, chronologically.

Annotated Chronology

1. January 24, 1828:

Horatio Allen sailed for England on the American ship *William Byrne*, which departed from New York around January 9, 1828, and arrived at Liverpool on February 15, 1828. During his time in England, he was charged by the D&H with specific instructions (see below). He was in England from February 15, 1828 to October 1828.

Horatio Allen, representing the D&H during his trip to England, was authorized by the Directors of the D&H and John Jervis (letter dated January 16, 1828) to serve as the agent for the D&H while in England. His specific instructions from the D&H and John Jervis, as reported by *State (*p. 13), are given on the following page:

Quoting here from *State*, p. 13:

“…to procure one locomotive engine complete, as a pattern…”

In 1828 the Board of the D&H Canal Co:

“. . . deemed it advisable to authorize Mr Allen to procure one locomotive engine complete, as a pattern and the Chief Engineer (John B Jervis) to ascertain whether it may be expedient to authorize the construction of all the locomotives in England”.

The instructions which Allen received from Jervis in New York in 1827 and in a letter dated January 16th 1828 have often been misquoted. The list below is the best summary:

“To investigate the provision of [emphasis added] four locomotives and to purchase one as a sample.”

- D&H to pay expenses up to a maximum of $900
- Stay not to exceed three months
- To investigate the provision of four locomotives and to purchase one as a sample. The locomotives are not to exceed four tons on four wheels and 6 tons to 7 tons on 6 wheels but a four wheeled locomotive is preferable. A locomotive should not cost more than $1800 “ which is cost that one can be procured in the US”[10]
- Investigate chains for the inclined planes
- To source strap rail. This to be trapezoidal in section 2½ inches on the base and 2 inches on the top with ½ inch thickness (see sketch below). The top corners may have a radius unless this increases cost and time.
- To investigate and report on the management of wheels on the same axle and purchase samples.

“to procure one locomotive engine complete as a pattern” (letter of S. Flewelling, D&H treasurer, to Allen).

As we will show below, Horatio Allen, in the 1880s, stated that he was not *sent* to England by the D&H.

9 Many authors report that Allen was an employee of the D&H at the end of 1827 and that he was “sent” to England. Others have it that Jervis himself had visited England . It is clear that it was Horatio Allen’s decision alone that he would resign and takes a sabbatical in Europe. Jervis just saw an opportunity, probably supported by Renwick, to use the offices of a sound and youthful engineer. I can find no support for Jervis visiting England

10 Quite how Jervis arrived at this figure is unclear, there being no US based locomotive builders. He was probably basing his estimates on the cost of *Locomotion* built for the Stockton and Darlington Railway in 1824/5 but this had been a depressed figure and costs had risen significantly in the four years since.

State’s point is well taken.

Regarding those instructions (in State’s report, above) from the D&H on wheels, we read the following in *Leslie* (p. 55):

“He was also asked to obtain information concerning the cost of wheels and axels for the coal car and about the ‘latest improvements that have been adopted in the manner of connecting the wheels and axels.’ ”

In addition to his instructions from Flewelling, Allen received more specific instructions from D&H Chief Engineer, John Jervis (letter of John B. Jervis to Horatio Allen, January 16, 1828). In <u>Leslie</u> (p.56) we read: "In more specific instruction, Chief Engineer Jervis told Allen that the purchase of three additional locomotives would depend on their cost:

"It is determined by the Board that you will procure from England one locomotive engine with carriage complete for work. <u>The three others that will be wanted to depend on the cost at which they can be obtained and delivered at New York</u> [emphasis added]."

c. July 19, 1829: *State* (p. 30): ". . . around July 19, 1828, Horatio Allen placed an order for three locomotives with Rastrick and one with Stephenson. Why Allen placed three with Rastrick, who at the time was untried in locomotive construction, is unclear, but the answer may come in the price, the Newcastle locomotive costing some £550 and those from Stourbridge £460 each."

The strap rail: Horatio Allen purchased/contracted for the strap rail from W. L. Sparrow of Temple Street, Wolverhampton, Staffordshire. He ordered 390 tons of rolled wrought iron strap rail: 15 ½ feet long, 2 ½ inches wide, and ½ inch thick.

The D&H needed no less than 16 miles of strap rail for the 1829 configuration of the Gravity Railroad. If each piece of strap rail was 15 ½ feet long, the D&H would need, therefore, 5,451 strap rails to open the road on October 9, 1829.

State (p. 21) reports that the needed strap rail was likely in New York by June 1828.

More on strap rails and T-rails:

The first railroads in the America were short tramways (see material above on Mauch Chunk and Quincy) built to haul heavy materials in and from quarries and mines, the motive power usually being horse, mule, or gravity. The earliest steam railroads used wooden rails with flat strips of bar iron secured to their upper surface. Owing to their lightness and especially to the danger of the 'strap' rails becoming loose and causing accidents, heavy rolled iron rails were imported from England. Until 1844, all of the rails used in the United States except most of the 'strap' rails and a small amount of cast-iron rails were imported. The rolling of heavy iron rails in this country was begun in 1844 at the Mount Savage Rolling Mill in Maryland. A few imported steel rails were laid in 1864, but the manufacture of Bessemer steel rails did not begin in the US until 1867.

At the beginning of 1840, most railroad rails were wood, with iron strapping for a bearing surface. Suitable for horse-drawn cars and other light rolling stock, these strap rails proved

unable to support heavier steam locomotives. In 1831, all-iron 'T' rails were developed for New Jersey's Camben & Amboy Railroad. The T-rails proved superior to strap rails, but widespread adoption was gradual. As late as 1845, 4,000 miles of railroads were laid with strap rails. The T-rail was the dominant new product of the period. By 1856, the manufacture of T-rails consumed over one-third of the nation's total output of wrought iron. (Puddling is a technique used to convert cast or pig iron into wrought iron.)

In Leslie (*Early Years*, pp. 29-30, we read the following about the first rails on the Gravity Railroad:

“. . . the first rails of the Gravity were six by twelve hemlock stringers set on edge. These stringers or ‘rails’ were twenty to thirty feet long. To withstand wear, iron strips imported from England were fastened to the tops of the stringers by screws set in countersunk holes which were slotted to provide for expansion in hot weather. The strips were one-half inch thick, two and one-half inches wide, and about fifteen and one-half feet long. Their edges were somewhat rounded during the rolling process, and one end was formed into a tongue five-eighths of an inch wide and three-quarters of an inch long. Since the other end had a slot of like dimensions, it can be seen that the end of one strip would fit into the next. The strips, which were somewhat narrower than the tops of the wooden stringers, were placed along the inner edges of the rails. / Hemlock contains many hard knots with rather soft wood between. The soft wood was compressed by the weight of the cars on the strips; the latter bent to conform to the depressions; and the track soon became ‘bumpy.’ As a result, the iron strips were taken up and relaid upon hardwood strips one and one-half inches thick and four inches wide which were spiked to the hemlock stringers. Since it was difficult to sink screws into the hardwood, the iron strips were refastened with spikes.”

One problem with strap rails is *snake-head.* In *Track and Roadway*, published by The Delaware and Hudson Railroad, n. d., p. 50, we read:

“The Strap rail was a flat bar of rolled iron, of various sections, spiked down to a longitudinal wooden stringer, and is chiefly remembered for its unpleasant tendency towards the formation of ‘snake-heads,’ so called; the ends curling up and at times going through the floor of the car.”

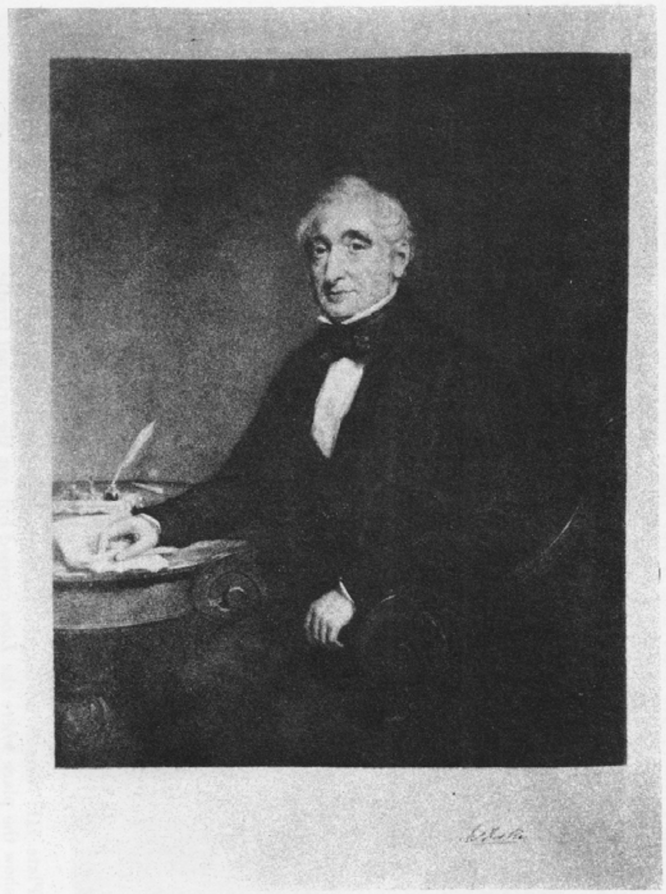
Fire Bricks:
In the collection of the Carbondale D&H Transportation Museum there are fire bricks that are marked “RUFFORD / STOURBRIDGE”. These bricks, which were used to line the interior of the fire chamber of each of the stationary steam engines on the Gravity Railroad, were found by John V. Buberniak at the head of Plane No. 7 on the Gravity Railroad.

These fire bricks were made by Rufford & Co., Stourbridge, England. It is not yet known when the D&H began to line the fire chambers of the stationary engines with these Rufford bricks. Possibly Horatio Allen ordered Rufford bricks for the D&H during his trip to England? Possibly the D&H began using Rufford bricks at a later date? In any event, these Rufford bricks were made in Stourbridge, England.

More on RUFFORD & Co. and Stourbridge Fire-Clay:

STOURBRIDGE FIRE-CLAY has a world-wide reputation, and its importance in the manufacture of fire-bricks, glasshouse pots, and a variety, of other-purposes in connection with the industrial arts need not be enlarged upon. Its chief value consists in its refractory character, which enables it to resist the highest temperatures without melting. As evidencing the importance of this industry, it may be stated that the quantity of clay raised in the Stourbridge district amounts to some 160,000 tons per annum, and the number of fire-bricks produced in a twelvemonth cannot be less than 40,000,000.

The *Stourbridge Lion* was designed by James Foster, who was a partner of John Urpeth Rastrick. The copy of the painting of James Foster that is given below is from Leslie's *Honesdale and the Stourbridge Lions*, p. 116:



Picture Credit: ***William Pardoe, Stourbridge, England***

Plate IV: James Foster, partner of John Urpeth Rastrick. It was Rastrick who designed the *Stourbridge Lion*, a fact heretofore largely ignored by historians.

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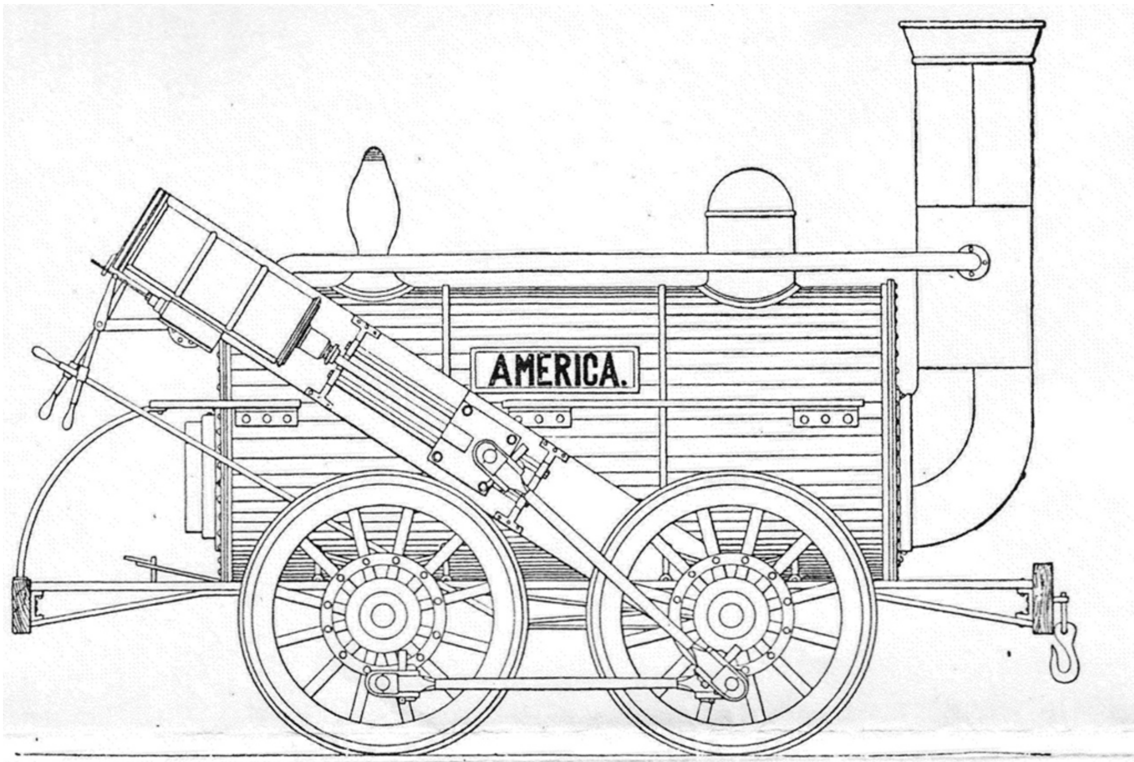
2. January 15, 1829:

Stephenson locomotive, *Pride of Newcastle:* made at Newcastle-upon-Tyne and sent from the Stephenson works (Robert Stephenson and Co. of Newcastle) to London on October 30, 1828 by the ship *Young Husband.* On November 27, it left London on the ship *Columbia* and arrived in New York City on January 15, 1829. Delivered it cost the D&H $3,663.30. Taken to Garrett Abeel and Edward Dunscomb Foundry, 375 Water Street, set up on blocks and demonstrated under steam on May 27; Philip Hone was present and saw the demonstration. On July 2 this *Pride of Newcastle* and the *Lion* were sent up the Hudson on the steamboat *Congress* and arrived at Rondout the next day. On July 16, both engines started up the canal on boats that had been sent for them. After the boats cleared Eddyville, mention of the *Pride of Newcastle* disappears from surviving D&H records and correspondence, save that on July 20, John Bolton wrote from Honesdale that the locomotives [note the plural] were expected to arrive on July 22. *(Leslie,* p. 76-77) There is no mention of a D&H engine called *The Pride of Newcastle* in *Century of Progress.*

In 1923, W. J. Coughtry "discovered in the Smithsonian Institution at Washington that a cylinder which on October 15, 1890, had been deposited there by Lindsay and Early of Carbondale, Pennsylvania, under the belief that it was a part of the *Stourbridge Lion,* was instead one of the cylinders of the *America [Pride of Newcastle]." COP, pp.* 52-53

Coughtry, p. 11: The Stephenson locomotive, the America, was the first to reach America and arrived in New York on January 15, 1829. Following a demonstration under steam in New York City on May 27, 1829, it was shipped to Rondout in the steamboat Congress, arriving there on July 3. It was started up the canal, clearing from Eddyville on July 16. No record of its arrival at Honesdale or at any other point on the canal has ever been found. It was never put in service and its disposition is still a mystery beyond the finding, in the Smithsonian Institution at Washington, D.C, of one of its cylinders and the iron wheel straps or bands affixed to the spokes between the hubs and tires which had been deposited there under the belief that they were parts of the *Stourbridge Lion* and the latter applied in error to the replicas of the wheels of the Lion now on the exhibition floor. The first of the Foster, Rastrick & Company locomotives to arrive was the *Stourbridge Lion* which reached New York on May 13, 1829.

In the 1890s, *the Pride of Newcastle* was incorrectly named *America* by Clement Stretton, as Raymond State has convincingly demonstrated in his *The Pride and The Lion* (2011, Wayne County Historical Society). At that time, Stretton produced the line drawing of what he called the *America*, that was published in the January 21, 1898 issue (p. 51) of *The Engineer*, shown below, and elsewhere:



R. STEPHENSON AND CO.'S "AMERICA," No. 12, 1828, DELAWARE AND HUDSON CANAL COMPANY

"The engine ordered from Messrs. R. Stephenson and Co. . . was named *America,* and was No. 12 in the books of its makers. It was built in the year 1828, and was shipped to New York on board the ship *Columbia*, arriving in January, 1829, or several months before the Stourbridge Lion, so that, though the later was actually the first practical locomotive which ran on metals in the United States, the *America* was the first to be seen. From the accompanying illustration, which is an exact copy of one of Stephenson's working drawings, it may be noticed that the *America* was a four-wheeled coupled engine with outside cylinders and a bar frame. This latter point is worthy of special attention on account of the claims sometimes made that the bar frame, almost invariably in use on American locomotives, was a native invention. As a matter of fact, it was introduced into American practice by British builders, some of whom—and notably the firm of E. Bury and Co.—adhered to the same system of framing for many years, dating prior to the introduction of locomotives into the United States. Stephenson's America was interesting on other accounts than as being the first locomotive, and the first with a bar frame, on the American Continent. While it had a bar frame in its capacity as a vehicle, as an engine it occupied a transition state, having a plate frame to carry the cylinders and motion, and it was, furthermore, one of the earliest examples of a four-coupled engine directly driven from the cylinders by

connecting rods without the intervention of beams or other cumbrous gearing. The wheels were built of wood, and were 4 ft. in diameter, and were driven direct, as has been pointed out, by two cylinders, 9in. in diameter with a 24in. stroke, which were inclined at an angle of 33 deg. to the horizontal. The boiler had a length of 9ft 6in., and a diameter of 4ft. 1 in., and contained a fireplace measuring 4 ft by 3ft., and two flue tubes each 19in. in diameter, which led to a chimney of substantial proportions, 1in. larger than the flue tubes. It is unfortunate that no very clear record seems to exist with regard to the work performed by these early engines. The *America* was broken up many years ago. " *(State*, p. 51)

The inaccuracies in the Stretton presentation of this engine, incorrectly named *America* by Stretton, are discussed on page 54 of State's book, which is given below.

State, p. 54:

16. What's in a Name?

Many authors use the name *America* for the Stephenson Locomotive. Clement Stretton used it in his *The Development of the Locomotive*[88] in 1896 but the drawing below was reproduced in 1893 in the *American Engineer and Railroad Journal* and may well have been produced as early as 1890. His drawing of the Stephenson locomotive has been reproduced many times and I make no excuses for reproducing it below:

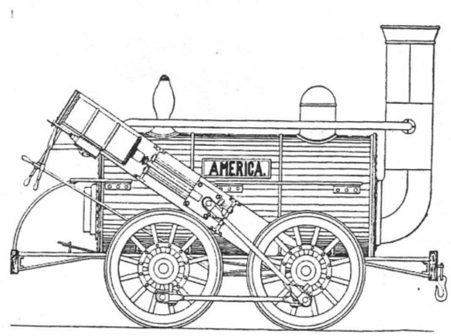


Fig 17 Stretton's America

"... Stretton produced a 'sports model' locomotive loosely based on *Lancashire Witch* but which had almost no correct dimension and has appurtenances fitted which the locomotive never had. . ."

When Stretton produced this drawing in the 1890's only one drawing[89] of Stephenson No 12 existed but this was buried in the Stephenson drawing office and was not discovered until after Stretton's death. Stretton did have access to drawings of the *Lancashire Witch* and the Description Book[90]. As result Stretton produced a "sports model" locomotive loosely based on *Lancashire Witch* but which has almost no correct dimension and has appurtenances fitted which the locomotive never had. The biggest departure is the name *America* on a nameplate which is very British but has no basis in fact. In 1924, when D&H President L F Loree presented his paper to the Newcomen Society in London he used the name *America,* to be pulled up sharply by Secretary Dickinson, who pointed out that the name was a fiction engineered by Stretton due his misreading of the Description Book.

"... when he [Stretton] could not determine the facts he made up the details and so he lost credibility. The Science museum later dissociated itself from his work."

Unethical and completely reprehensible behavior on the part of Clement Stretton

88 Clement Stretton in the 1890s was a leading authority on railways and august bodies such as the Science Museum in London, England used his services. However, as the 20th century dawned it became clear that when he could not determine the facts he made the details up and so he lost credibility. The Science Museum later dissociated itself from his work.

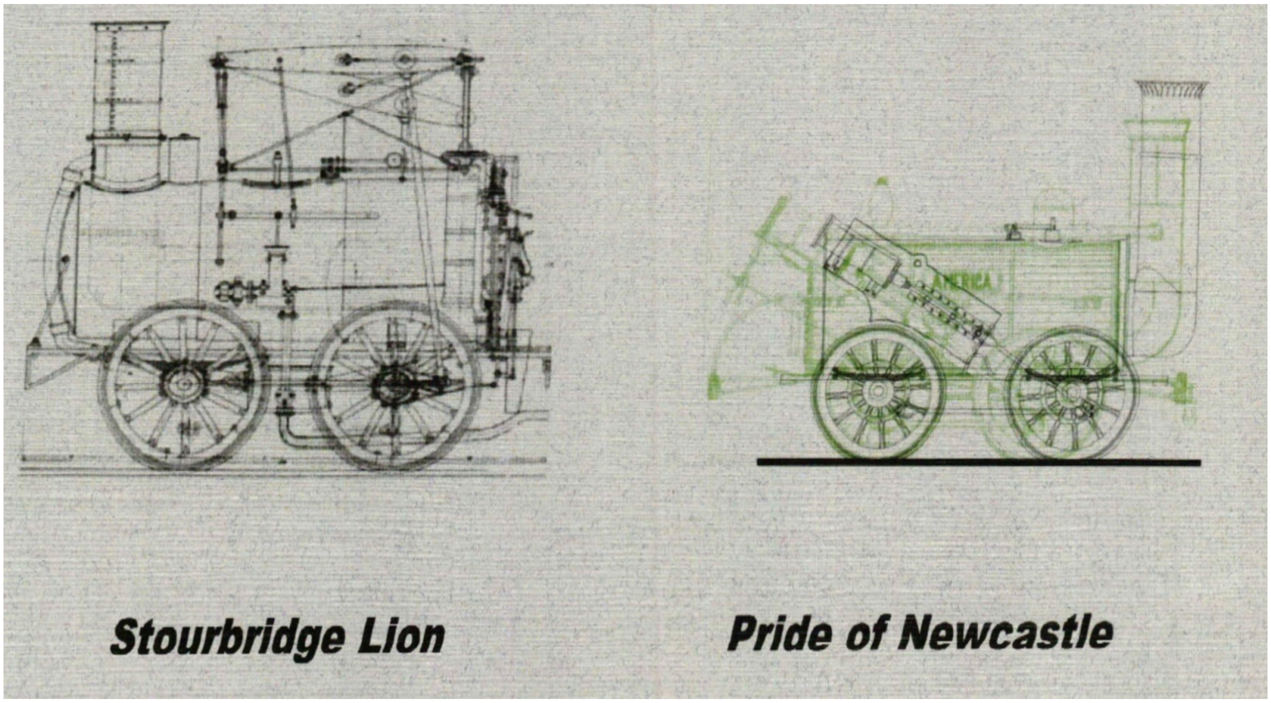
89 It is difficult to work out what was in Stretton's mind. He had access to the drawings of *Lancashire Witch* and the dimensions in the Description Book yet almost none of the dimensions of the Stretton version are correct. The Stephenson drawing is an arrangement of the boiler drawn in July 1828 on which is written "*Engine for Mr Allen*", This drawing is in the Newcastle Archives and gives the cylinder position, wheels and boiler arrangement from which the drawing on the cover is produced with reference to other critical dimensions provided by the Description Book.

90 Three books have survived from the Stephenson Works. The Description Book has the Works Number and the details of all locomotives built from 1828. Although created in 1831 the records from 1828 to 1831 were copied from an earlier document and it is errors in this copying which has led to mistakes over the name. The other two books are the Works Ledger detailing the sales and charges and the Order Book which contains the orders placed.
In 1896 the Description Book was in the possession of the Science Museum but the other two are more recent discoveries.

The Pride and the Lion Page 54 of 78 Wayne County Historical Society

In State's remarkable book, there are two correct line drawings of the *Pride of Newcastle:* one on the front cover of the book, and one in Appendix A (p. 68).

Here is the line drawing on the front cover, with the caption from page 2:

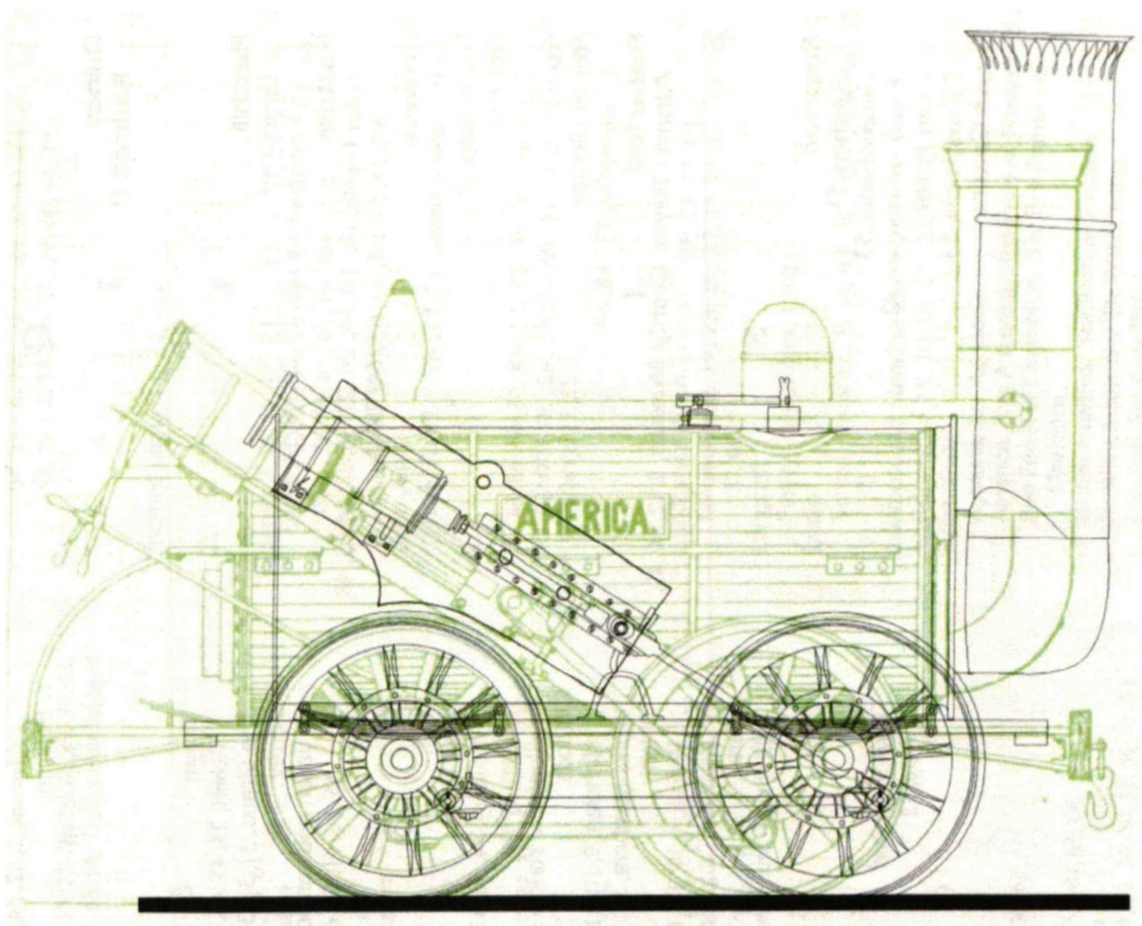


The *Pride of Newcastle* (right), sometimes known incorrectly as *America*. The black outline has been produced from a general arrangement drawing of its sister locomotive *Lancashire Witch*, the details in the builder's Description Book and a boiler drawing in the Newcastle, England archives. The green outline is the fictional representation by Clement Stretton created in 1893 (see text and Appendix A).

The left picture is of the *Stourbridge Lion* showing the heat exchanger visible between the wheels and the outline of the fire tube.

These two locomotives were present in Honesdale in late July and August 1829 when the first locomotive to run on the North American Continent was put into operation.

Here is the one in Appendix A (p. 68):



The *Pride of Newcastle* showing the green outline of the drawing made by Clement Stretton in 1890s. The Stretton rendition not only has the wheelbase incorrect but has the cylinders in the wrong place. The addition of a dome and "pop" safety valve is pure fiction as is the nameplate. The black outline is generated from the boiler drawing and the general arrangement of sister locomotive *Lancashire Witch*. For details of Clement Stretton – see text.

Specifications for *Pride of Newcastle (State*, p. 29):

Pride of Newcastle. See *State*, pp. 29-30, 55. State argues, convincingly, that this heading should read:

"Description of Allen's engine for America [i.e., *Pride of Newcastle]* (no 12) constructed 1828

The details for works number 11 and 12 are:

Detail	Description of *Lancashire Witch (No 11) constructed 1828*	Description of Allans (sic) engine America (no 12) constructed 1828
Boiler		
Diameter of boiler	4ft	4ft 1in
Length of boiler	9ft	9ft 6in
Diameter of fireplace	4ft 3in	4ft 3in
Heating surface of boiler	66 sq ft	Not tabled
Size of fire tube	1ft 6in	1ft 7in
Number of fire tubes	2	2
Tubes	Straight	Straight
Cylinder		
Diameter of steam cylinder	9in	9in
Length of stroke	2ft	2ft
Angle of cylinders to horizontal	39^0	33^0
Size of steam passage	4¼x¾in	Not tabled
Proportion to cylinder	1/20	Not tabled
Proportion of space for water to contents of cylinder	30 times	Not tabled
Proportion of space for steam to contents of cylinder	42 times	Not tabled
Chimney		
Size of chimney	1ft 8in	1ft 8in
Pump		
Size of hot water pump	1½in	1½in
Length of stroke	2ft	2ft
Proportion of quantity injected to cylinder	1/16	Not tabled but probably the same as no 11
Principle Dimensions		
Extreme length of engine	12ft	Not tabled
Extreme height of engine	8ft 4in	Not tabled
Wheels (wood)		
Diameter of wheels	4ft	4ft
No of wheels	4	4
Other		
Weight of water	18½ cwt (2072lbs)	Not tabled
Other details not in Description Book		
Wheelbase	4ft 9in	6ft

3. February 1829:

Stourbridge Lion shipped from Stourbridge to Liverpool

4. April 8, 1829:

The *John Jay,* carrying the Stourbridge Lion (a Foster and Rastrick and Co. engine) departs from Liverpool for New York.

5. May 13, 1829:

Stourbridge Lion, in sections, was sent from Stourbridge to Liverpool in February 1829, and left that port on April 8. *Stourbridge Lion,* arrived in New York on May 13, 1829 from Liverpool on the *John Jay*. Cost to the D&H delivered, $2,914.90. <u>Unloaded and taken to the shops of William Kemble, the agent of the West Point Foundry</u> [emphasis added], the sections of the engine were assembled there, and the engine was set up on blocks and demonstrated there under steam on May 28; exhibited there for six weeks and seen by thousands of people. On July 2 this *Pride of Newcastle* and the *Lion*—together with eighty pairs of car wheels—were sent up the Hudson on the steamboat *Congress* and arrived at Rondout the next day. On July 16, both engines started up the canal on boats that had been sent for them. After the boats cleared Eddyville, mention of the *Pride of Newcastle* disappears from surviving D&H records and correspondence, save that on July 20, John Bolton wrote from Honesdale that the locomotives were expected to arrive on July 22. It arrived on July 23, 1829. Horatio Allen was waiting at Honesdale when the *Lion* arrived there. By August 5, the *Lion* was on the track at Honesdale; trial run, August 8, 1829. On September 9, a second run of the *Lion* on tracks in Honesdale took place. Lion removed from tracks and stored there for 20 years. About 1849, it was taken to Carbondale, where the boiler was put to use in the D&H shops and many of the other parts also worked up for use. In the eighties, it was located in the foundry yard of Lindsay and Early. On June 18, 1889, Lindsay and Early deposited the boiler in the Smithsonian. A number of other parts of the *Lion* were also deposited there.

Hollister:

"He [Horatio Allen] ordered three locomotives from England but brought but one (?) [That first sentence is given here exactly as it is given in the Hollister typescript.] The 'Stourbridge Lion' arrived in New York in May 1829, was put together in June of this year by Horatio Allen then Assistant Engineer upon the Delaware and Hudson Canal and Railroad, arrived in Honesdale July 23 on the Canal, where, as in New York it was an object of wonder curiosity and observation. / Its arrival in New York City was an event of such importance that the *Morning Courier and New York Inquirer* of July 12, 1829, gave minute description of its singular features and of its ability 'to propel sixty or eighty tons at five miles per hour, while the *Dundaff Pa. Republican* thus describes its appearance at Honesdale July 23, 1829. / 'The boats begin to arrive

with the traveling engines [note the plural] and railroad machinery; all is bustle and business. The engine intended for this end of the road is a plain, stout work of immense height weighing about seven tons, and will travel four miles per hour, with a train of thirty to thirty-six carriages, leaded with two tons of coal each. The engine is called the 'Stourbridge Lion,' its boiler being built something in the shape of that animal, the body at least twelve feet in length and five in diameter, traveling at the rate of four or five miles per hours, together with a host of young ones in train, and you will have some idea of the scene before us; but the enchantment is broken and in a few days the whole will be set in motion, and we will now give you information that, when the whole is in operation, we shall give a general notice that we intend to hold a day of rejoicing and the completion of the same and shall give a general invitation to our fellow-citizens to attend. . ." *(Hollister,* unpublished typescript, 1880, p. 44 and p. 44; two pages numbered page 44 in succession)

May 1829:

John Torrey, March 28, 1870: "This locomotive [the *Lion*] and two others [the so-called *Delaware* and the so-called *Hudson]* purchased by or made for the company in England arrived in New York in May 1829." *(State,* p. 44) Regarding the arrival dates of the *Delaware* and the *Hudson,* footnote No. 64 on page 40 of *State* reads: "The second locomotive which we will call *Delaware* arrived by the ship *Splendid* in August and the third, *Hudson* by the ship John Jay on September 17."

May 27, 1829:

Diary of Philip Hone: "Wednesday, May 27, 1829.—Immediately after dinner at home, I took Miss Helen Kane to the shipyards to witness the launching of the ship 'Erie' a fine vessel, interned as one of the Harve line of Packets. Thence I went to Abeel and Dunscomb's Foundry to meet a large party of gentlemen who were assembled <u>by invitation</u> [emphasis added] to see one of the new locomotive <u>engines</u> *[Pride of Newcastle]* in operation, which was recently imported from England for the use of the railroad belonging to the Delaware and Hudson Canal Company."

Note based on data from *State* (pp. 58-59) about putting into operation the *Pride of Newcastle* in Abeel and Dunscomb's Foundry, and then again at Honesdale: less steam was required to simply turn the wheels when the engine was when raised off the ground, as it was when in Abeel and Dunscomb's Foundry, than in Honesdale, when the engine was on tracks and needed sufficient steam for traction.

6. May 28, 1829:

Diary of Philip Hone: "Thursday, May 28, 1829—The second locomotive steam engine *[Stourbridge Lion]* which was imported for the Delaware and Hudson Canal Company, was set in operation this afternoon at the works of Messrs. Kemble in presence of a large number of gentlemen, and succeeded as well as the one I saw yesterday at Abeel and Dunscomb's." (Note: Raymond State dates, incorrectly, this journal entry as June 11, 1829. Philip Hone, be it known, did not write a journal entry on June 11, 1829.)

John B. Jervis, July 17, 1870: "This locomotive [the *Lion*] and two or three others were obtained from England for the rail road but only the *Lion* was set up." *(State*, p. 44)

7. June 22, 1829:

Letter from Horatio Allen to John Jervis: "I agree with you thinking it best to put the *Pride of Newcastle* on the summit plane [Level No. 5] and find that we must take it to pieces before we send it up. . ."

8. July 2, 1829:

Stourbridge Lion and another engine *[Pride of Newcastle]*, together with eighty pairs of car wheels (probably from the West Point Foundry), sent up the Hudson on the steamboat *Congress;* arrived at Rondout the next day, July 3.

9. July 16, 1829:

Stourbridge Lion and another engine *[Pride of Newcastle]* started up the canal on boats that had been sent by the D&H for them. After the boats cleared Eddyville, the second engine disappears from surviving D&H records and correspondence, save that on July 20, John Bolton wrote from Honesdale that "the <u>locomotives</u> [emphasis added] were expected to arrive on July 22."

10. July 23, 1829:

Stourbridge Lion and *Pride of Newcastle* arrive at Honesdale; Horatio Allen waiting there for the *Stourbridge Lion*

The arrival of the *Stourbridge Lion* at Honesdale in 1829 is referenced in a two-part part article in the August 23, 1829 issue, page 2, of the *Dundaff Republican.* The article is, in effect, a two-part *Letter to the Editor.* Part I is headed: *"For the Republican.* / HONESDALE, July 21, 1829. /

Mr. Editor—Permit me through the medium of your useful paper, to make known some of the passing events of the day at this place. . ." The second part of that article, dated July 23, (in a slightly modified form) is reprinted on page 78 in Clark's 1875 "The Wyoming Valley . . ." Here is the second part of that article, which is headed and dated "July 23", as published in the *Dundaff Republican and Canal & Rail Road Intelligencer* of August 13, 1829, p. 2:

"July 23. / The boats begin to arrive with the Travelling <u>Engines</u> [note the plural word 'engines']; and Rail Road machinery [strap rail and chains]; all is bustle and business. The engine intended for this end of the road is plain, stout work of immense height, weighing about seven tons, and will travel four miles per hour, with a train of 30 to 36 carriages loaded with two tones of coal each; the engine is called the Stowbridge [sic] Lion, its boiler being built something in shape of that animal, and painted accordingly; now imagine to yourself the appearance of that animal, the body at least twelve feet in length & five in diameter, traveling at the rate of four or five miles per hour, together with a host of young ones in train, and you will have some idea of the scene before us; but the enchantment is broke, and in a few days the whole will be set in motion, and we will now give you notice, that when the whole is in operation, we shall give a general notice that we intend to hold a day of rejoicing on the completion of the same, and shall give a general invitation to our fellow-citizens to attend. We have procured a large cannon, and intend to station it on the top of the high peak to sound on the occasion. I am growing tedious and will close on the subject Yours with respect, / [signed] *A Strict Observer. (Dundaff Republican,* August 13, 1829, page 2.)

11. July 24, 1829*:*

Pride of Newcastle placed on the tracks at Honesdale

12. c. July 28, 1829:

Stourbridge Lion placed on tracks at Honesdale

In the Sullivan County Democrat, September 13, 1979, p. 145, we read the following about the tracks in Honesdale upon which the *Pride of Newcastle* and the *Stourbridge Lion* were placed:

"The First Track / John Raymond Laid the First Railroad Track / by E. B. Calloway / The honor of building the first mile of railroad track in America goes to John Raymond, a native of Walton, Delaware County, New York. He died in Scranton, Pa., 1883. Of John Raymond's part in the construction of the first piece of railroad in this county, The New York Sun had the following to say: 'There is a grave in Greenwood Cemetery,' said an old-time railroad man, 'the stone at the head of which bears only the name of the man whose remains are buried there, the date of his birth and the date of his death. Yet the man, John Raymond, built the first mile of railroad for commercial use and designed for locomotive power ever put down on the American

continent. / 'That was in 1828, and the initial mile of railroad was the beginning of the Delaware and Hudson Canal Company's railroad between the head of its canal at Honesdale, Pa. and its coal mines at Carbondale. And on the first mile of track the first locomotive *(Stourbridge Lion)* to turn a wheel in America was run in August, 1829. John Raymond ought to have a place in history." *(Sullivan County Democrat,* September 13, 1979, p. 145)

13. August 1, 1829:

Letter from John Jervis to John Bolton: "The locomotives have been got out [of the canal boats and onto tracks] without any injury of consequence and we shall probably be able to make an experiment with the Lion on Monday (August 4) or Tuesday (August 5) next." As State points out (p. 42), in this letter is the first instance, which has survived, of the mention of the name *Lion.*

Both *Stourbridge Lion* and *Pride of Newcastle,* when removed from the canal boats and placed on tracks at Honesdale, were fired up, so to speak. *Pride* would not steam because its boiler would not burn the anthracite; *Stourbridge Lion* would steam but, given its weight, would damage/destroy the track. The *Stourbridge Lion* was used on August 8; the *Pride of Newcastle* was not. (See *State,* pp. 59-60)

See Raymond State's excellent account of the unloading of *Stourbridge Lion* and *Pride of Newcastle*, pp. 41-44 ("14. Unloading at Honesdale – July 21 to August 7 1829)…---With the locomotives out and the incline plane dismantled Jervis was able to restore coal loading from July 31 as previously mentioned."

14. August 8, 1829:

Trial run of *Stourbridge Lion*

On August 8, 1829, Horatio Allen test drove the *Stourbridge Lion* in Honesdale, PA. We will present below an account of that test run by Horatio Allen himself.

As is well known, the initial test run of the *Lion*—and a second run on September 9, 1829—demonstrated conclusively to the D&H that locomotives could not—and would not—be used on the three levels (No. 5, No. 7, and No. 8) in the 1829 configuration of the Delaware and Hudson Gravity Railroad.

Trial Runs of the *Stourbridge Lion*:

Raymond State (p. 49) says the following on these test runs of the *Stourbridge Lion:* "With the single run on August 8 1829 and further short outings in August and September 1829 which lifted more strap rail and with the *Pride of Newcastle* out of service the locomotive experiment at Honesdale ceased."

More on the cannon, referred to above:

"Melancholy Accident.—We are informed that a young man by the name of Adams, was seriously injured on Saturday last, at Honesdale, by the sudden and unexpected discharge of a canon. Adams, in connexion with others was engaged in firing signals, on starting the Locomotive Engine." *(Dundaff Republican, and Canal & Rail Road Intelligencer,* August 13, 1829, p. 3)

In *Mathews*, p. 241, we read the following about the cannon: "During the trail, or just after it had been made, a small cannon, a six-pounder, which had been captured from the British, was used to voice the enthusiasm of the crowd more emphatically than was possible by other means. Upon its second discharge it shattered the arm of Alvah Adams, who was one of the gunners. This accident, so far as is now known, was the only one of the day." In a footnote on page 241, *Mathews* reports:

"The same cannon was used for firing a salute at the funeral of Captain Joseph Loeven, of the German Artillery (and of Company C, One Hundred and Twelfth Regiment, P. V. A.) in 1867, and bursting, wounded Benjamin Looris and Anthony Boos."

On the cannon: *Ruth*, p. 20, reports: "Tragically, after a series of successful discharges [of the cannon], their [a group of young men] cannon went off while it was being loaded, mutilating the face and arm of one of the young attendants. The victim's injuries were so severe that his arm had to be amputated above the elbow in an emergency operation for which the D&H Company, recognizing its indirect contribution to the tragedy, picked up the tab."

In the archives of the Wayne County Historical Society there is a newspaper clipping on which is a story titlted "Paul Preston Letter and Allen's Story." Here is the text on that clipping:

“The following letter from Hon. Paul S. Preston to his sister is not only valuable as showing the exact day upon which the first locomotive trip in America was made, but on account of the particularity with which the event is described, including the sad accident which marred the festivities of the day:

‘Bethany, Pa. , Aug. 9, 1829

Dear Anna:--A most dreadful accident occurred yesterday at Honesdale in firing a cannon, by a set of foolish boys, or rather young men, who, by the way, knew about as much about firing cannon as they did about prudence. The consequence was that a young man of the name of Adams had his left hand torn off at the wrist joint with the exception of the thumb and part of one finger, and the arm so mutilated and broken that it had to be taken off above the elbow. The right arm is also badly mutilated, and may yet have to be taken off, and if it should it would have to be taken off above the elbow. His face is much burnt and a more deplorable looking object can hardly be conceived of. The weather is so warm that his life will run a great risk, but he has one thing in his favor, youth and a vigorous constitution, combined with the most heroic firmness of mind and body. I acted as an assistant to Dr. Roosa, and never did I witness, neither do I ever expect to again, so much fortitude in man; hardly a groan escaped him, although he appeared perfectly rational, conversing with the doctor at times during the operation with stoic calmness. / ‘They were firing the cannon in honor of the starting of the new steam engine on the railroad, which, during the time, was majestically running up and down on the railroad in view of the village, as completely under the command of the engineer as if it had been possessed of life and reason. / ‘After the operation, Sam and myself went down to the basin and got an on board the tender and rode about three or four hundred yards up the road and back again; we did not go faster than about four miles an hour. I afterward rode the same distance up and back at about the rate of eight miles an hour and a distance of from 15 to 20 feet from the ground. I thought of Darwin’s prediction, where he says (if I quote correctly,): ‘Soon shall thy power, unconquered steam, from far, / Drag the slow barge, and urge the rapid car.’ / I am told they have since let it go at the rate of twelve miles an hour. I saw it myself from Forbes door running at the rate of not less than ten miles an hour, at the time the mail stage was coming down the hill from towards Cherry village and passing directly under the rail road as the Engine was passing over the road, both Engine and Stage were running at about the same rate. / It is said that it can run at the rate of eighteen miles an hour, I have no doubt of it. They are now merely running it for the purpose of trying the road, and dare not give it all its speed. The road, I fear, will prove insufficient. Money, however, will make a more permanent one. / I am a complete convert to the practibility [sic] and utility of rail roads, and should I live to they age have no doubt but I shall see them in successful operation as the medium of rapid travelling, transportation of the mail, merchandise, etc. / What would not the expense of the last war do towards accomplishing such an object. / Thine Affectionately, / Paul S. Preston.” Note: Paul S. Preston’s father was Judge Samuel Preston.

More on Alvah Adams: In the *Honesdale Herald* of July 23, 1874, we read: “The young man Adams who had his arm blown off while firing a salute in honor of the first locomotive in this place in 1829, is now living in Butternuts, Otsego County, N. Y., at the age of 69. He is hale and hearty and weighs upwards of 200 pounds.”

Locomotives Ruled Out for Use on the Three Long Levels, Horses In:

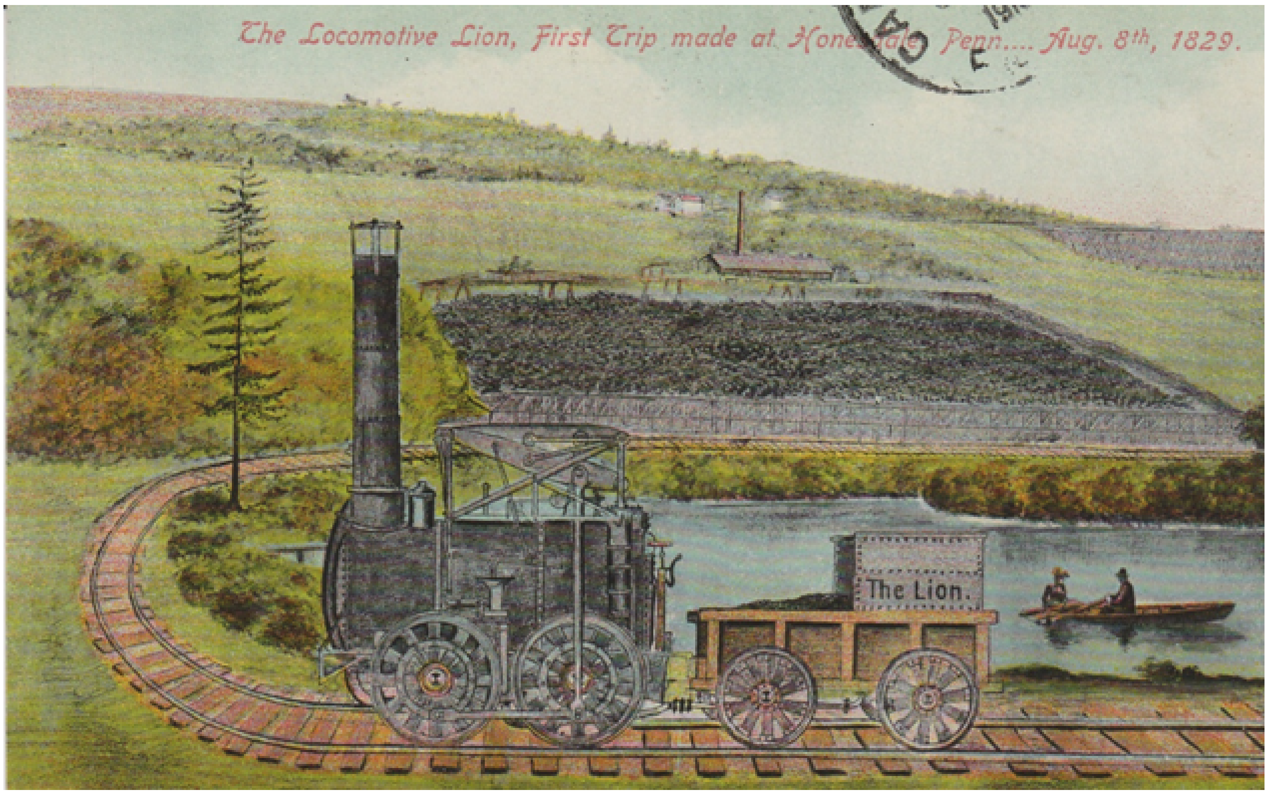
Since locomotives could not be used on the levels, Jervis had to use horses. He also had to have towpaths constructed along the tracks for the horses to walk on; also, most certainly, towpaths constructed on elevated portions of the levels; also he had to have horse cars built in which the horses could ride down the Six-mile level. This had to be done in two months, for opening on October 9, 1829.

In *Ruth* (p. 21), we read: “Using horses . . . meant that tow-paths would have to be built along the three long levels where the locomotives were proposed to run, and planking or dirt would have to be placed between the tracks on the elevated stretches where tow-paths were not possible.”

Calendar in the collection of the Wayne County Historical Society, Honesdale, PA:

Painting by Clyde Osmer DeLand, c. 1917, of the first run of the *Stourbridge Lion.* There is a high level of verisimilitude of this event in this rendering by DeLand.

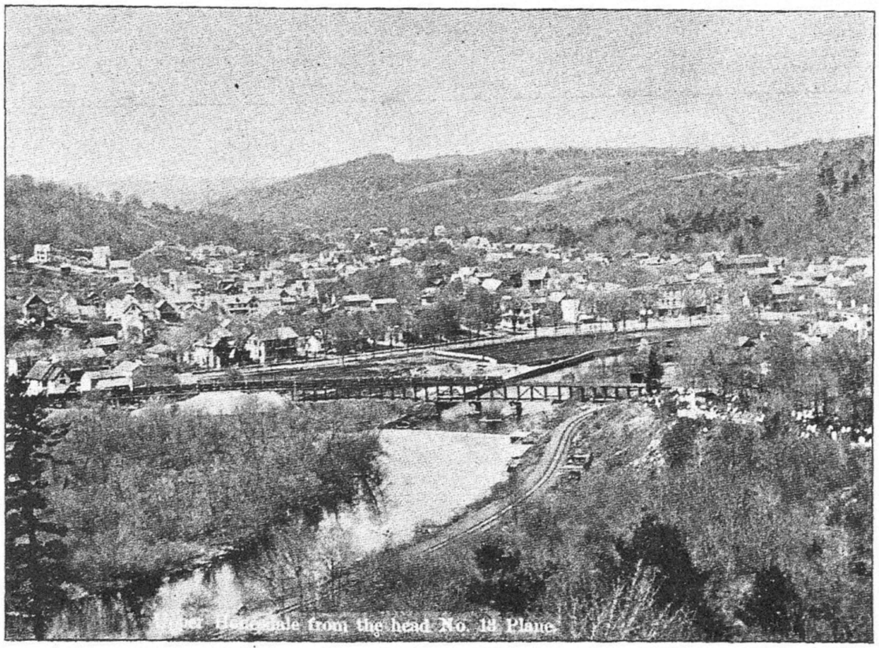
Fanciful, but interesting, post card view of the trial run of the *Stourbridge Lion* on August 8, 1829. This view contains several features that were characteristic of the Honesdale D&H operations in the nineteenth century (Lackawaxen River, coal pockets, stationary steam engine, extensive trestle-works on Level No. 13). In addition, there is a relatively high level of accuracy in the rendering of the *Stourbridge Lion* itself.



The Locomotive Lion, First Trip Made at Honesdale, Penn… Aug 8th, 1829.

Post card in the Rex Reynolds album in the collection of the Carbondale Historical Society. The photo was published by J. B. Nielsen, Honesdale, copyright 1910.

Where the trial run of the *Stourbridge Lion* took place *(Penniman,* 1903):



WHERE THE FIRST LOCOMOTIVE WAS RUN IN AMERICA.

This illustration of Upper-Honesdale shows where the trial trip of the Stourbridge Lion was made, including the trestle-work bridge and Lackawaxen creek, over which the engine passed. The main and business portion of Honesdale lies directly south of this view.

In the archives of the Wayne County Historical Society, there is a newspaper copy of the photo given above, at the head of which is this title: "Location Where Lion Made Its First Run". Here is the caption on this photo given there:

The above picture is a view of North Honesdale, showing residential section. In the immediate foreground is the Lackawaxen river, "loaded track" of the Gravity Railroad of the Delaware and Hudson Canal Company and in the center of the picture, a railroad bridge crossing the river. The latter is the exact site over which the Stourbridge Lion made its initial run, August 8, 1829, but not the same trestle. Just North of this track is the Honesdale Flouring Mill. It was completed in 1838 by John Torrey, Richard L. Seely and Jeremiah C. Gunn, doing business as Gunn & Co. The latter was an experienced miller when he came into Wayne county from Geneva, N. Y. The business of the mill was conducted under his direction for many years. Afterwards Charles T. Weston and James R. Jackson were millers. Later John T. Torrey purchased it wholly and he rented it to Peter J. Cole and following him Thomas Fowler. The building burned about 1894. The Stourbridge School is now located in the wooded area shown at the left of the picture. The P. P. & L. power station is now located at the right.

At the right of the river, about center of picture is a plot of ground, known as "God's Acre," donated by Jason Torrey adjacent to the old Methodist Church, but not owned by that parish. In a deed Mr. Torrey specified the burying ground is conveyed to the "Burgess, Assistant Burgess and Town Council of the Borough of Honesdale, their successors and assigns forever," for burial purposes. The first interment took place September 11, 1830, the remains being Emeline, the first wife of Dr. Ebenezer T. Losey. The first cemetery of Honesdale was located near the point, confluence of Dyberry and Lackawaxen rivers. Bodies from this cemetery were later removed to "God's Acre." The deed for this plot of ground was dated Bethany, April 26, 1834, and was witnessed by Richard L. Seely. It was recorded July 23, 1839. The consideration was $1.00. Glen Dyberry cemetery was originated by a company organized under provisions of a State Charter, granted January 26, 1854. The first grave opened in the new cemetery for the reception of the body of Dr. William F. Denton, who was buried Nov. 21, 1859.

Horatio Allen before and after 1829:

Like Benjamin Wright (the father of American civil engineering) and John B. Jervis, Horatio Allen was an engineering genius who was a member of the D&H team in the 1820s, and it is well to review here some basic facts about the man before August 8, 1829, when he piloted the *Stourbridge Lion* into the pages of American history. (The primary source for biographical material on Allen is the *Memorial* on the man that was written by M. N. Forney and published in *Transactions of the American Society of Mechanical Engineers,* Volume X, that was published in 1889.) We will then take a look at Allen's career after the trial run of the *Stourbridge Lion* in 1829.

Allen was born at Schenectady, NY, May 10, 1802. His father was Dr. Benjamin Allen, professor of mathematics at Union College; his mother was Mary Benedict Allen, a person of culture and considerable social standing. In 1823, Allen, after two years of study, graduated from Columbia College. He was near the head of his class, with honors in physics and mathematics. He began working for Benjamin Wright on the Erie Canal as a rodman and within two weeks was placed in charge of a surveying party and within a year was a resident engineer. In 1825, he began working for the D&H, under John B. Jervis, as resident engineer on the Summit level of the D&H Canal, then under construction. In 1827, he left the employ of the D&H, and made arrangement to go to England to study locomotives as agent of the D&H, the D&H agreeing to pay his round-trip passage and expenses during a stay of three months, the whole amount of those expenses not to exceed $900.

Horatio Allen before and after the *Stourbridge Lion*: from *Penniman*, pp. 4-7:

Nor is the life of Horatio Allen to be summed up in his connection with the trial trip of the Stourbridge Lion, unique as was that event, and far-reaching in its consequences. By him that might well have been regarded as a passing incident in a long and busy life. From early manhood to extreme old age Mr. Allen was almost continuously filling important positions in the various branches of his chosen calling, and his name is intimately associated with many of the great engineering triumphs which made the 19th century famous. He was born in Schenectady, N. Y., May 10th, 1802, and died in Montrose, N. J., December 31st, 1889, aged 87 years, 7 months and 21 days. His father, Dr. Benjamin Allen, was professor of mathematics at Union College; his mother, Mary Benedict Allen, was a woman of superior culture and high social standing. He married, at the age of 32, Mary Moncrief Simons, daughter of Rev. James Dewar Simons, Rector of St. Philip's church, Charleston, S. C., who, with three sons and a daughter, survived him at his death. He was mainly educated at Columbia College, N. Y., graduating with honors in 1823. Having taken high rank in mathematics, he chose engineering as his calling, and within a year was made Resident Engineer of the Chesapeake & Delaware Canal Co. In 1825 he was appointed Resident Engineer of the summit level of the Delaware & Hudson canal, then in course of construction, and later had charge of the section between the Summit level and the Delaware river. Having finished his work he resigned, and, attracted by the railway agitation in England which reached a high point in 1826-7, made up his mind to visit that country with a view to informing himself in that branch of his profession.

. . . . p. 5: . . . .

After that event [trial run of *Stourbridge Lion*] Mr. Allen took charge of the construction of the South Carolina railroad, becoming its Chief Engineer in September, 1829. He was at the same time Consulting Engineer of the Erie. Early in 1831, having recommended to the President and Directors of the South Carolina Railroad the use of locomotives….

to be built after specifications furnished by him, he was sent North, and within a year had superintended the construction at West Point of four engines, the first one built and put in operation being named the "South Carolina." In 1835, after the completion of the road, Mr. Allen, with his wife and her mother, went abroad, and spent nearly three years in foreign travel. Of this trip his capable biographer, Mr. M. N. Forney, says: "After a summer in England and Scotland, and a winter in Paris, he visited the principal cities of the continent and made the entire passage of the Danube to the Black Sea and Constantinople, went thence to Smyrna, the Asiatic coast, to Athens, and across the Levant to Alexandria and spent the winter on the Nile. In the spring of 1837 he went to Naples and Rome and returned to Paris, and from there to England, from which he sailed for New York late in 1837." In 1838 Mr. Allen received the appointment of Principal Assistant Engineer of the Croton Aqueduct, and on its completion first turned on the water for the supply of New York City. He was also one of the five commissioners entrusted with the distribution of the water through the city. In 1842 he became one of the proprietors of the celebrated Novelty Works, in New York, the firm being Stillman, Allen & Co. When it was changed to a stock company Mr. Allen was made President of the concern. The works employed 1,500 men during the civil war, filling immense contracts for the army and navy. The machinery of the steamships Pacific, Baltic, Atlantic, Adriatic and Arctic of the old Collins line, and of the fine vessels of the Pacific Mail Steamship line, was all built under his supervision. The establishment was the largest in the country for building marine engines, and, besides the lines named, furnished the machinery for two of the finest war ships of the Italian navy. During the war it built engines for

three gunboats, the sloops Adirondack and Wampanoag and the monitors Miantonomah and Roanoke. During his connection with the Novelty Works, Mr. Allen acted in the capacity of Consulting Engineer for the Erie Railroad and was President and Chief Engineer of the Company for a year. He was Consulting Engineer for the Panama Railroad Co., and held other important engineering trusts, including that of Consulting Engineer of the Brooklyn Bridge. Mr. Allen was philanthropic and charitable, and was a member of several organizations having for their object the amelioration of the condition of the poor. He also took great interest in art, antiquities and history, and was instrumental in adding largely to New York institutions devoted to their advancement and preservation. He was the author of two mathematical works and one on Astronomy, to facilitate which latter study he invented and constructed a number of instruments. All in all, his life was a notable one, full of activity and usefulness, and one which had an exceptional influence in advancing the material progress of his country during his day and generation.

Allen then embarked on an important engineering career with a wide variety of companies. His "after the Lion" career is nicely described in Edward A. Penniman's pamphlet titled *The Stourbridge Lion,* which is quoted by *Leslie* (pp. 60-61) as follows:

See *South Carolina note* on page 64.

After that event [the trial run of the *Lion*] Mr. Allen took charge of the construction of the South Carolina railroad, becoming its Chief Engineer in September, 1829. He was at the same time Consulting Engineer of the Erie.[22] Early in 1831, having recommended to the President and Directors of the South Carolina Railroad the use of locomotives to be built after specifications furnished by him, he was sent North, and within a year had superintended the construction, at West Point of four engines, the first one built and put in operation being named the "South Carolina"[23] In 1835, after the completion of the road, Mr. Allen, with his wife[24] and her mother, went abroad, and spent nearly three years in foreign travel . . . In 1838 Mr. Allen received the appointment of Principal Assistant Engineer of the Croton Aqueduct, and on its completion first turned on the water for the supply of New York City. He was also one of the five commissioners entrusted with the distribution of the water through the city. In 1842 he became one of the proprietors of the

Another of Allen's achievements was the construction of High Bridge, which carried the Croton Aqueduct across the Harlem River to New York City.

Allen had built the famous reservoir at 42nd Street and Fifth Avenue in New York where the Public Library now stands.

22. The Erie Railroad was chartered as the New York and Erie in 1832.
23. Penniman's sources evidently misled him concerning the construction of the engines: the West Point Foundry was in New York City; Allen designed only one type of engine, and the extent of his supervision of the construction of engines is questionable; the **South Carolina** (designed by Allen) was not the first engine built—the **Best Friend of Charleston** was the first to be built and put into service. It is also questionable whether the four engines spoken of were all built within a year.
24. Horatio Allen married Mary Moncrief Simons, daughter of the Reverend James Dewar Simons, Rector of St. Philip's Church, Charleston, South Carolina.

celebrated Novelty Works, in New York, the firm being Stillman, Allen & Co. When it was changed to a stock company Mr. Allen was made President of the concern. The works employed 1,500 men during the civil war,[25] filling immense contracts for the army and navy. The machinery of the steamships Pacific, Baltic, Atlantic, Adriatic and Arctic of the old Collins line, and of the fine vessels of the Pacific Mail Steamship line, was all built under his supervision. The establishment was the largest in the country for building marine engines, and besides the lines named, furnished the machinery for two of the finest war ships of the Italian navy. During the war it built engines for three gunboats, the sloops Adirondack and Wampanoag and the monitors Miantonomah and Roanoke. During his connection with the Novelty Works[26] Mr. Allen acted in the capacity of Consulting Engineer for the Erie Railroad and was President and Chief Engineer of the Company for a year. He was Consulting Engineer for the Panama Railroad Co., and held other important engineering trusts, including that of Consulting Engineer of the Brooklyn Bridge. Mr. Allen was philanthropic and charitable, and was a member of several organizations having for their object the amelioration of the condition of the poor. He also took great interest in art, antiquities and history, and was instrumental in adding largely to New York institutions devoted to their advancement and preservation.[27]

25. In accordance with a rule of historiography, all direct quotations given in this book retain the spelling, syntax, capitalization, and punctuation of the original.
26. The history of the Novelty Works is an interesting one. After Horatio Allen became a member of the firm, its products were varied, and in addition to marine engines, it produced stationary steam engines, sugar refining machinery, pumps, steam fire engines, hydraulic presses, etc. After the Civil War, the profits of the company declined, and it went out of business in 1870—see Forney, n.d.:18-21, 24.
27. Penniman, 1905:4-7.

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South Carolina note:

The South Carolina Canal and Rail Road Company was established by the legislature on December 19, 1827. "The charter of this company was to build a railroad from Charleston to Hamburg, Columbia, and Camden, and a canal between the Savannah River and the Ashley River. Stock was sold in early 1828, and a survey was commissioned. <u>In mid-1829, Horatio Allen was hired as the chief engineer</u> [emphasis added]. Construction of the 149.5 mile route began in Charleston on January 9, 1830. Most of the early track was built on pilings, with flat bars used as rail on top of wood pilings, except for the curves, where flanged rails (more expensive) were used. The first locomotive was ordered in the summer of 1830 from the West Point Foundry in New York City, and arrived in Charleston on October 23, 1830. This locomotive was named the 'Best Friend of Charleston.' " *(BLHS Bulletin,* December 2015, p. 19, "The Month of December in Railroad History" from Midwest Rail Scene Report.)

In *Inspection of Lines, 1927,* pp. 11-12, we read the following about the engine “South Carolina”:

“In 1831, Horatio Allen designed a locomotive for The South Carolina Railway Company called the ‘South Carolina.’ This locomotive was built at the West Point Foundry in New York City and was considered remarkable in that it had eight wheels, which were arranged in two trucks. / Ross Winans conceived the idea of the adaptation of the principle Mr. Allen had proposed and adopted for locomotives ‘to passenger and other cars’ and on October 1, 1834 was granted letters patent on eight wheeled cars. Winans afterward brought a number of actions of law against railroads for infringement of his patent, which was the subject of legal controversy for twenty years. He claimed that the idea originated with him as far back as 1831, and was not perfected until 1834. / The dispute was finally carried to the Supreme Court of the United States and decided against Mr. Winans in 1854.” (*Inspection of Lines*, 1927, pp. 11-12)

Additional facts reported by *Leslie* (pp. 61-64) on Horatio Allen's post-*Stourbridge Lion* career:

- Horatio Allen was a member of the American Society of Civil Engineers and served one term as its president
- He also belonged to the American Society of Mechanical Engineers, and was made an honorary member of both societies, being the first honorary member of the latter organization after it was founded
- He was a founder of the Urban League Club, an organizer of the Association for the Improvement of the Condition of the Poor
- He was an active member of the Children's Aid Society
- He was an active member of the New York Gallery of Art (Together with others, he helped preserve the Abbott Collection of Egyptian Antiquities, a collection which is said to have become the property of the New York Historical Society.)
- He was the author of two mathematical works and one on Astronomy, to facilitate which latter study he invented and constructed a number of instruments (Allen made an orrery, which is an apparatus which by means of spheres moved by gears shows the motions and relative positions of the bodies in the solar system.)
- He wrote in 1884 a booklet on the beginning of the railroad era in America
- Founded on an idea that Allen expressed as early as 1831, he later designed and had built the *South Carolina,* with eight wheels, two one-cylinder engines, and two smokestacks. The carrying wheels at each end of the *South Carolina* were mounted on trucks or bogies. These trucks were capable of swiveling to follow curves. This was to become a standard feature of locomotive design.
- He obtained patent for seventeen inventions.
- He served as consulting engineer for the Brooklyn Bridge

Horatio Allen retired in 1870 and built a house at Montrose, NJ, where he died (East Orange, NJ) on December 31, 1889. He was survived by his widow, three daughters, and a son. During the 1929 *Stourbridge Lion* centennial observance, Horatio Allen's granddaughter, Mrs. R. D. Lewis of Orange, NJ, unveiled a commemorative bronze plaque in Riverside Park, Honesdale.

The trial run of the *Stourbridge Lion* on August 8, 1829 was an important "first" in the history of railroading in America. In the article titled "D&H Gave Steam Locomotives Start" by Barnett Fowler that was originally published in the April 22, 1973 issue of the *Albany Times Union* (article reprinted in the June 2017 issue of the *Bridge Line Historical Society Bulletin* , pp. 30-31), we read, on pages 30-31 of the reprinted copy of the article:

"Throughout the entire period of steam-on-wheels in America, the D&H has played a distinguished part. Its accomplishment in operating the *Stourbridge Lion,* even though limited, was a first in America. It preceded the first American-built locomotive, the "Tom Thumb",

which ran Aug. 28, 1830 on the Baltimore and Ohio in a test run, but was never put into regular operation. It preceded the first American-built steamer 'Best Friend on Charleston", which was tested in 1830 and hauled passengers a spell, until it blew up in 1831. / **The first successful** steam locomotive to be actually operated for any length of time in America was the *DeWitt Clinton,* which ran between Albany and Schenectady, starting service Aug. 31, 1831; this locomotive was made by the West Point Foundry, and the Mohawk and Hudson line upon which it ran eventually became part of the New York Central."

15. August/September 1829:

Footnote No 64 in *State* (p. 40): The second locomotive which we will call *Delaware* arrived by the ship *Splendid* in August and the third, *Hudson,* by the *John Jay* on September 17. On these two locomotives, State states (p. 50): "As for *Delaware* and *Hudson*, the two other locomotives from Stourbridge, they were carried to Rondout and placed in store but were damaged beyond any repair in a fire and the parts broken up for scrap some time after 1834."

Regarding those two engines, sometimes called the *Delawar*e and the *Hudson*, we read the following in the article, signed by L. G., about the trial run of the *Lion* on August 8, 1829, that was published in the Philadelphia *Press* and reprinted in the *Carbondale Advance* of February 3, 1883, p. 2: ". . . The other two locomotives [besides the *Stourbridge Lion* from *Foster and Rastrick]* were never used, nor were they ever put up."

16. September 9, 1829:

Second run of *Stourbridge Lion*

17. September 17, 1829:

Footnote No 64 in *State* (p. 40): The second locomotive, called *Delaware* by some, arrived by the ship *Splendid* in August and the third, *Hudson,* by the *John Jay* on September 17. On these two locomotives, State states (p. 50): "As for *Delaware* and *Hudson*, the two other locomotives from Stourbridge, they were carried to Rondout and placed in store but were damaged beyond any repair in a fire and the parts broken up for scrap some time after 1834."

About the *Delaware:* Built by Foster Rastrick and Company under Allen's order. This engine, or the *Hudson*, was forwarded from Liverpool on June 21, 1829, by the ship *Splendid*, reaching New York on August 9. This engine, or the *Hudson*, cost delivered to New York, $2,994.40. Sent up to Rondout. "Both [the *Delaware* and the *Hudson]* were forwarded to Rondout, the first of these two, with the exception of the cistern, on the sloop *Cornelia* which left New York on

September 6, the cistern following on the steamboat *Congress* on September 7, and the second on the sloop *Cornelia,* leaving New York on October 3 or 4. The boiler of the last locomotive was not loaded on the *Cornelia* but was sent up the river on the sloop *Forrester* on October 21. After reaching Rondout, the later history of the *Delaware* and the *Hudson* is extremely uncertain…: *COP,* pp. 59, 61

About the *Hudson:* Built by Foster Rastrick and Company under Allen's order. This engine, or the *Delaware,* was forwarded from Liverpool on August 8, by the ship *John Jay,* reaching New York on September 17. This engine, or the *Delaware,* cost delivered to New York, $2,992.90. Sent up to Rondout. "Both [the Delaware and the Hudson] were forwarded to Rondout, the first of these two, with the exception of the cistern, on the sloop *Cornelia* which left New York on September 6, the cistern following on the steamboat *Congress* on September 7, and the second on the sloop *Cornelia,* leaving New York on October 3 or 4. The boiler of the last locomotive was not loaded on the *Cornelia* but was sent up the river on the sloop *For*rester on October 21. After reaching Rondout, the later history of the *Delaware* and the *Hudson* is extremely uncertain…: *COP,* pp. 59, 61

18. 1829-1849:

Stourbridge Lion stored in a shanty on the dock in Honesdale, where it remained for years, a prey to rust and decay. Its boiler was finally taken to Carbondale, where it was used for a long time in a foundry. The rest of the machine was sold for old iron, and hacked to pieces by relic-hunters.

On this point, State remarks: "As for the locomotives *[Stourbridge Lion* and *Pride of Newcastle], the Dundaff Republican* records the *Stourbridge Lion* was placed in a shed and 'the other one *[Pride of Newcastle]* on the ground on the berm side of the canal.' Over the years iron parts were stolen and the locomotives deteriorated. John Torrey recalls that children were frightened by the lion head on the front of the Stourbridge Lion." (p. 49)

What remains today of *Pride of Newcastle?* The wheels and one cylinder (in the Smithsonian) survive. In footnote No. 87 on page 53, *State* says the following on this question:

> Albert Rutherford and I have exchanged a number of mails on the mystery of what happened after August 1829. The fact that the D&H offered the locomotives including the *Pride of Newcastle* for sale in 1834 would seem to indicate that the parts if not a whole locomotive was still around some 5 years after 1829. That no-one recalls the locomotive would seem to indicate that it was dismantled very quickly. There would not be many parts. The boiler, two cylinders and two wheelsets would be the major components. We know that at least one cylinder (maybe both) found its way to Carbondale, the wheels remained in Honesdale and the boiler may have been stored pending its disposal as described in the notes above. The rest comprising the connecting rods, cylinder mounting plate and bar frames would have been attractive to the D&H blacksmiths being first quality steel.

19. 1849:

About 1849, *Stourbridge Lion* was moved to Carbondale, where the boiler was put to use in D&H shops and many of the other parts also worked up for use. Boiler used for over 20 year, and then sold.

On the fate of the *Stourbridge Lion* from 1845 to the present, Raymond State provides very good information in his excellent book (pp. 50-52). Here are those pages:

For some fifty years there was silence on the fate of the locomotives, and therefore for the subsequent history we must turn to the investigations of the emerging railroad historians and the local press from 1881.

As we have noted, William Brown investigated the early history in his book in 1870[76]. In 1876 Philadelphia held a Centennial Exhibition, now considered the first Worlds Fair. The Pennsylvania Railroad's vintage locomotive *John Bull* and train was on display and created much interest when compared to one of Matthias Baldwin's latest 4-4-0s[77].

The first in the field was the *Wayne County Herald* April 14 1881, which printed an inaccurate paper by one Colonel James Albert Clark on the *Stourbridge Lion*. He reported that the boiler of the *Lion* had been taken to Carbondale and was still working there. The article was taken to task by one J.T of Honesdale for the inaccuracies in a response in the same paper of May 12 1881. J.T of Honesdale may be John Torrey but the style and content does not suit that well informed citizen of Honesdale. These articles were followed by more accurate ones by *Carbondale Leader* for September 4 1888 and a response from the *Honesdale Citizen* of October 4 1888. From these and from the investigations of John H White it is possible to extract the following hazy events;

- *Stourbridge Lion* remained in its shed slowly decaying and being robbed of removable parts until 1845[78].

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75 The letter is recorded in John H White's book *A History of the American Locomotive and Development 1830-1880.* White offers the suggestion that the sale was declined owing to the locomotives being slow and of a flue tube design which was considered obsolete. There is also a suggestion that the Columbia Railroad also made enquiries. It is believed the letter resides in the archives of the Pennsylvania Railroad Museum.

76 *The History of the First Locomotives in America* by William H Brown 1871. He was unable to obtain much information about the subsequent disposal of the locomotives but it did act as a spur to others.

77 John H White in his book *A History of the American Locomotive and Development 1830-1880* says that *Stourbridge Lion*'s boiler was displayed but this fact is not confirmed in the list of exhibits

78 The *Carbondale Leader* article of September 1888 relies on an investigation by J A Hall editor of *The Locomotive Engineer.* The article shows many errors. Amongst these is the assertion that the *Stourbridge Lion* was sold and dismantled in 1834. Dilton Yarrington later recalled that he visited the locomotive in 1842 still in its shed and covered in rust.

- On April 26 1893 the *Wayne County Herald* printed the recollections of boys who played on the old engine. This letter is on page 94 of Vernon Leslie's book. The *Leader* also says "at Carbondale . . . we saw the signature of Horatio Allen . . . stating that the boiler was of the *Stourbridge Lion*". A detailed search in Carbondale has failed to find any such document. However, a photograph of the boiler of *Stourbridge Lion* carries an inscription which may be the "signature" alluded to by Hall in the Leader. The inscription is reproduced below.

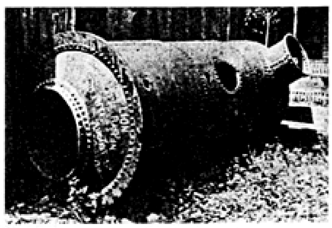

Fig 15 The boiler at Carbondale

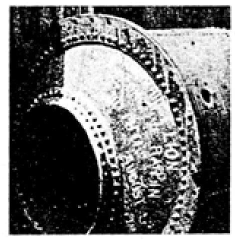

Fig 16 The inscription reads: **"Stourbridge Lion locomotive ran in Honesdale August 8 1829"**

- In 1845 John Simpson, foundryman of Carbondale, purchased the locomotive for its boiler and cylinders[79]. Much of the locomotive was scrapped but some of the "walking" beams were preserved. Simpson set the boiler up on brick plinths and fired the boiler under the shell using the old firebox and the flue. One cylinder was used on a stationery engine.
- In 1850 Simpson closed the foundry but it was to be re-opened in 1856 by John Stuart and William Lindsay[80]
- In 1869 Patrick Early, who have served his apprenticeship in the foundry, bought out Stuart and the firm became Lindsay and Early. However by 1871 the old boiler was showing its age[81].

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79 As for many things to do with story there is much speculation. Albert Rutherford quotes a footnote in John White's book stating that it was G C Maynard who interviewed many "old" men in 1904 who gave the Simpson purchase explanation. Vernon Leslie pointed out this version does not square with either the D&H's papers of 1923 or 1933 which state the boiler was taken into the D&H own shops in Carbondale. John Torrey follows the same line in his letters of 1870. Matthew just says that the boiler was in a foundry in Carbondale. Vernon Leslie goes on to record that one Dilton Yarrington wrote ". . . . in 1852 I saw the boiler on a railroad car which took it to the foundry of John Simpson Jnr who had purchased it from the Delaware and Hudson Company". Albert Rutherford believes that there is a case for the *Lion* boiler to have been in the D&H workshops for a few years before being sold on to Simpson.

80 The spelling of the name Lindsay is uncertain. The date of Simpson's departure is also uncertain being quoted in some quarters as "after 1852".

81 A curious entry in *The New York Times* for July 23 1888 records "The boiler of the first locomotive that ever turned a wheel on the American continent, the *Stourbridge Lion* . . . is in daily use in a foundry in Carbondale, Penn."

However, they misquote the date of its first run as August 29 1829 so some suspicion must be applied to this note. The source is believed to be *The Engineering News* for July 14 1888.

- Early records that steam pressure was raised by adding weight to the safety valve[82] and that it consumed 1 ton of coal per day which was between 5 and 7 times the consumption of a modern boiler.
- The boiler was set aside and a photograph exists from about this time. The inscription may have been the one inscribed under the supervision of Horatio Allen during his visit to Carbondale in 1881[83].
- In 1874 Early recognising the relic's importance tried to sell it for $1000 but there were no takers.
- In 1883 Samuel H Dotterer of the D&H RR borrowed the boiler and sent it to the Exposition of Railway Appliances at Chicago between May 24 and June 23. En route or at the Exposition the boiler was attacked by relic hunters who severely damaged it. On its return it was repaired and Early again sought to exhibit it but when this failed it was offered to the Smithsonian who had previously acquired *John Bull* as the start of a transport section. The gift was dated June 20 1888 but the transfer may not have taken place in October 1890.
- Later the Smithsonian set out to acquire other artefacts. *Lion*'s beams and one cylinder and some wheels were acquired[84]. The Smithsonian sought to assemble the *Lion* but had some difficulty[85]. The locomotive is currently at the B&O museum at Baltimore on loan from the Smithsonian showing the beams and one cylinder in place.
- The current *Stourbridge Lion* is a replica based on the drawings of *Agenoria*. It is a working replica but requires much work to place the locomotive in to running order. For details of the replica see the museum.

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82 Early says that pressure was raised by 3 to 4 times its designed pressure or to 150 to 200lbs per sq inch. This is either an exaggeration or the strength of the old boiler was much greater than the designed working pressure would indicate.

83 Carbondale Leader for September 4 1888. Horatio Allen also made an address on the D&H locomotives at the opening of the New and Erie Railroad in 1851. The address was at Dunkirk, New York. The details are in Vernon Leslie's book page 80.

84 Like everything else the details of the artefacts are confused. John H White in his book on the history of the locomotive says "The walking beams are undoubtedly from *Stourbridge Lion* but the other items are likely to be from *Pride of Newcastle*". Albert Rutherford says that three wheel rims (tires) and three crank rings were stored in the D&H offices at Honesdale (now the museum) and were the ones acquired by the Smithsonian. It would appear the wooden parts had decayed.

White went on to say "The cylinder (acquired by the Smithsonian) was separated from its mounting flange with which it was fixed to the locomotive boiler at the foundry". This description fits that of a cylinder of the *Pride of Newcastle* and one of these is displayed today in the museum at Washington alongside a fictional drawing of the locomotive by Clement Stretton. White also says that the cylinder was used on pumping engine No 6 at Carbondale. However, the boiler at Baltimore shows one original Stourbridge cylinder in place. The details of which cylinder and which boiler and the dates are much confused and therefore some research is still required.

85 It would appear that the Smithsonian Museum went to some length to reconstruct the wooden wheel centres with new steel axle trees to which the recovered tires and drive rings were fitted. They had to make one new tire and drive ring from the pattern of the three obtained. A photograph of the boiler and wheels taken in 1914 shows these wheels in place, that is, until members of a visiting English Newcomen Society party pointed out the error.

19. 1855:

Given below is an article about the *Stourbridge Lion* that was published in the *Carbondale Transcript and Lackawanna Journal*, November 30, 1855, p. 2:

"G. M. Reynolds, / *Dear Sir:*-- The enclosed morceau I clipped from a newspaper several years ago. Thinking you might regard it an interesting 'item' for publication, in this region particularly, I enclose it to you for that purpose, if you should regard it as I do, of sufficient interest. / Yours respectfully, WM. WURTS. / Carbondale, Nov. 27, '55. /

THE TRIAL TRIP OF THE FIRST LOCOMOTIVE.—Major Allen, the Engineer of the New York and Erie Railroad, in a speech made during the recent festival excursion, gave the following account of the first trip made by a locomotive on this continent:

When was it? Where was it? And who awakened its energies and directed its movements? It was in the year 1828, on the banks of the Lackawanna, at the commencement of the Railroad connecting the canal of the Delaware and Hudson Canal Company with their coal mines—and he who addresses you was the only person on that locomotive. The circumstances which led to my being alone on the engine, were these: the road had been built in the summer, the structure of hemlock timber, and rails of large dimensions notched on caps placed far apart. The timber had cracked and warped from exposure to the sun. After about 300 feet of straight line, the road crossed the Lackawanna creek, on trestle work about 30 feet high, and with a curve of 350 to 400 feet radius. The impression was very general that this iron monster would either break down the road, or that it would leave the track at this curve, ad plunge into the creek. My reply to such apprehensions was that it was too late to consider the probability of such occurrences; that there was no other course but to have the trial made of the strange animal, which had been brought here at great expense; but that it was not necessary that more than one should be involved in its fate; that I would take the first ride alone and the time would come when I should look back to the incident with great interest. / As I placed my hand on the throttle valve handle, I was undecided whether I would move slowly or with a fair degree of speed; but believing that the road would prove safe, and preferring if we did go down, to go handsomely, and without any evidence of timidity, I started with considerable velocity, passing the curve over the creek safely, and was soon out of hearing of the cheers of the vast assemblage present. At the end of two or three miles, I reversed the valves, and returned without accident, to the place of starting, having thus made the first railroad trip, by locomotive, on the Western Hemisphere. /

What is called 'Lackawanna creek' should be, I suppose "Lackawaxen,' as the occurrence was at Honesdale. W. W." (*Carbondale Transcript and Lackawanna Journal*, November 30, 1855, p. 2)

20. January 24, 1870:

Newspaper clipping, titled "The Fate of the Stourbridge Lion," in the archives of the Wayne County Historical Society:

"THE FATE OF THE STOURBRIDGE LION / Hon. John Torrey's Account of First American Locomotive / Since the death of Hon. John Torrey, of Honesdale, interest in the pioneer trip of the Stourbridge Lion locomotive upon which Mr. Torrey and ex-judge Avery were fellow passengers, has perceptibly increased. The following letter written by Mr. Torrey to a friend under the date of Jan. 24, 1870, and kindly placed by the recipient at the Tribune's disposal throws valuable light upon this important historical event. The letter follows: / 'The first locomotive run by the Delaware & Hudson Canal company on their railroad in Honesdale (and, it is believed, the first ever run in America) was manufactured by Foster, Bastwick [sic] and Company, of Stourbridge, England (a manufacturing town on the river Stour, about fifteen miles west from Birmingham). Its front was ornamented by a huge, fierce looking face of a lion in bold relief, and it's [sic] name 'Stourbridge Lion,' was prominently placed upon it by the makers. It was placed on the railroad for trial in the early part of August 1829, at a time when I was absent on a journey to Philadelphia. / 'I find by memoranda made at the time I was in Philadelphia on the first three days in August, 1829, and that near the evening of August 3, I started on my return and that I was home on August 7. I also find an entry in the account book kept by my brother at that time under date of August 3, 1829, in which he charges the Delaware and Hudson Canal company with labor of men and horses drawing stones, etc. to load a railroad car, in this I understand to be a railroad car to attach to the locomotive on track.' From these dates, I think the locomotive must have been as late as the 3r and as soon as August 7th, and that it was probably on August 3rd or 4th. When I first saw the locomotive after my return from Philadelphia it had been removed from the rails and was standing on the ground (or on some plank) on the northeastern side of the railroad track near opposite the northeastern corner of the old graveyard. While standing there, it was an object of great dread to many of the children who were obliged to pass near it, and many now among us can remember the curved route and hasty steps they used to take when passing the frightful Lion. / In the succeeding fall, it was closely housed in with rough boards, and as indicative of the time of this covering (I find in my brothers account a charge to the Delaware and Hudson Canal company dated November 27, 1829, for 'boards to cover the steam engine.' Here it remained with some of the covering torn off so that the curious could view the monster for some twelve or fifteen years, until so many of its parts were broken or detached and taken away, that it was not considered worth repairing and I think was sold for old iron. Some of its parts are still preserved as mementos of the first locomotive seen upon a railroad in America.' Scranton Tribune, March 23, 1894."

21. 1870:

Article from *The Railroad Gazette,* Volume I, August 27, 1870, p. 517, about the *Stourbridge Lion:*

"The First Locomotive. / The Rondout. New York, *Courier* gives the following account of the first locomotive in America: / Not many of the present inhabitants of Rondout are aware that the first locomotives in America were brought here [Rondout] in 1829, on the sloop *Eliza,* then sailed by Charles McEntee. There were two of them sent from England in the ship *George Canning*, by Horatio Allen, then a young civil engineer in the Delaware & Hudson Canal Company's service, who had [been] sent to England in 1827 to purchase four locomotives to be used on the company's railroad connecting the mines at Carbondale with the mines [canal] at Honesdale. Some months later two more engines arrived from England in the ship *Elisha Hicks,* Mr. Allen coming with them. They were put in two canal boats, towed up here by the old *Congress* and sent to Honesdale, where one was put on the track. Mr. Allen ran for a short distance up the trestle bridge and up the road, and then backed it down. None of the locomotives were used after that, as they were declared too heavy for the road, although weighing only four tons each. The two that arrived first never were sent up the canal, but stood for years in a shed near where a store now stands, and were finally broken up and sold to James W. Baldwin—for old iron we believe. / Mr. Allen has the honor of being the man who ran the first locomotive in America. He is now one of the engineers of the East River Bridge. Thurlow Weed says that the first locomotive run in America was on the Albany & Schenectady Railroad; but he is mistaken, for the company's road was built about three years before work commenced on the Albany & Schenectady—John B. Jervis being chief Engineer of both works, going to take charge of one after completing the other." *(The Railroad Gazette,* Volume I, August 27, 1870, p. 517)

22. 1870:

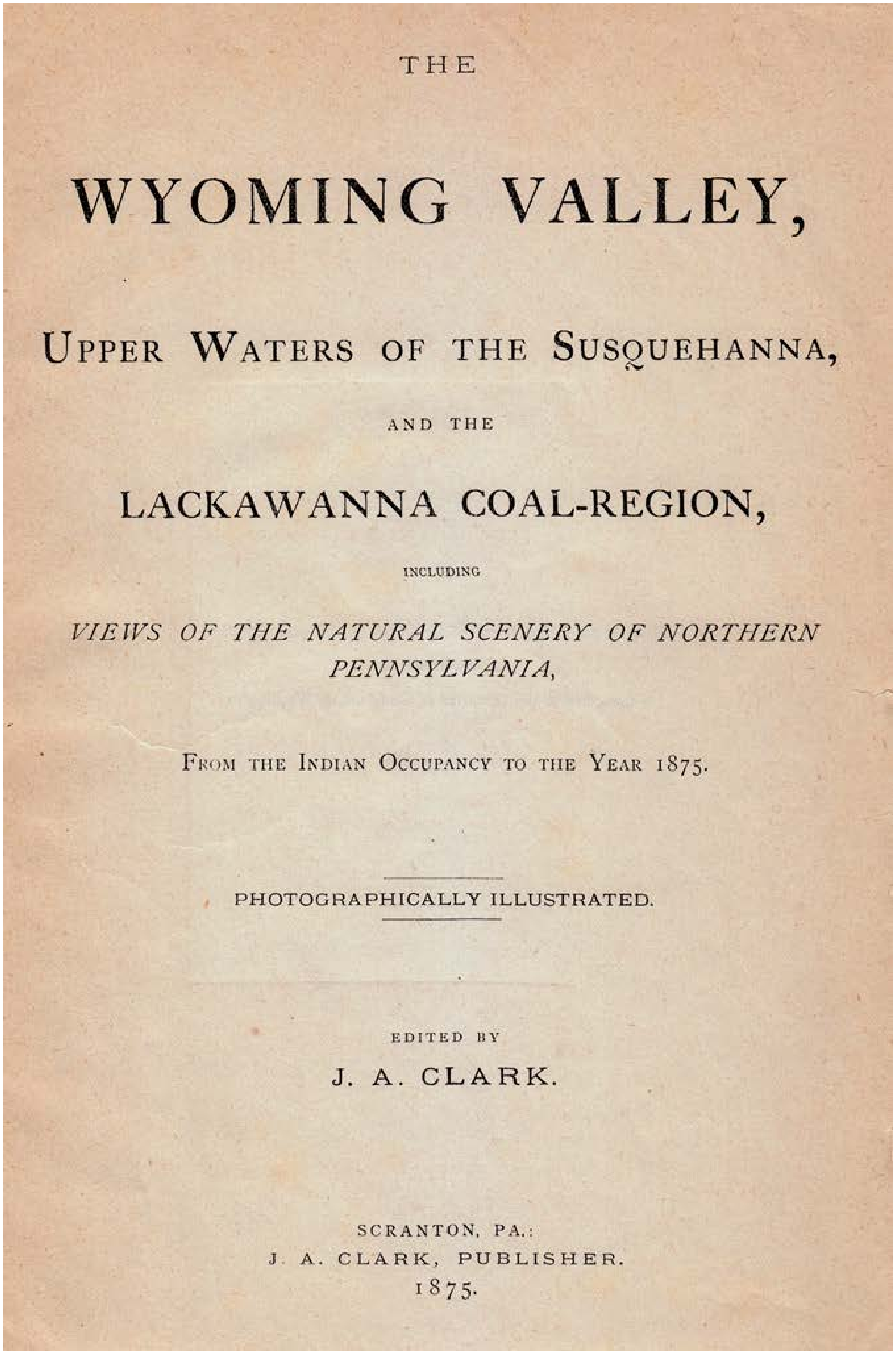
Article from the *Carbondale Advance,* November 28, 1870, p. 3, about the *Stourbridge Lion:*

"For the *Carbondale Advance. /* CARBONDALE NOV. 24th, 1870. / Editor *Carbondale Advance: /* It may not be generally known to the readers of your valuable paper, that the boiler of the first Locomotive Engine introduced and run in the United States, now lies outside the foundry of Messrs. Lindsay & Co., corner Mill and 7th street, in this city. Such however is the fact, and can be seen any day, by those who take an interest in relics of early engineering. H. Hollister in his history of the Lackawanna Valley, gives the following description of this locomotive. / 'The first locomotive engine introduced and worked in America was run upon the Del. & Hud. R. R., in the year 1828, and Hone's Dale (named from the late Philip Hone) offered its friendly glen for the purpose of conducting the experiment. This locomotive called the 'Stourbridge Lion,' was built in England, of the best workmanship and material and most

approved pattern of that date. The road passed out of Honesdale by a sharp south-westerly curve, with a moderate grade, and was carried over the Lackawaxen by a long hemlock trestling, considered too frail by many to support the great weight of the mysterious engine looking engine all ready for the hazardous journey. / As the crowd gathered from far and near, expected that bridge, locomotive and all, would plunge into the stream the moment passage was attempted, no one dared to run the locomotive across the chasm but Maj. Horatio Allen, who amid exultation and praise passed over the bridge and a portion of the road in safety. The engine, however, was abandoned, as the slender trestling forming much of the body of the road, sufficiently strong for ordinary cars, was found too feeble for the weight and wear.' Maj. Allen in his account of this first trip of a locomotive on this continent says: 'As I placed my hand on the throttle, I was undecided whether I would move slowly or with a fair degree of speed; but believing that the road would prove safe, and preferring, if we did go down, to go handsomely, and without any evidence of timidity, I started with considerable velocity, passed the curve over the creek safely, and was soon out of hearing of the vast assemblage. At the end of two miles I reversed the valve and returned without accident, having thus made the first railroad trip by locomotive on the western hemisphere. The strange animal was taken from the track, and for many years stood in a shanty, near the M. E. Church in Honesdale. / The first steam train in America was an excursion from Albany to Schenectady on the Mohawk and Hudson R. R. in 1831. The engine was the *De Witt Clinton*, built by the West Point Foundry of New York city in 1831, and run the first trip in July of that year. Her cylinders were 5/8 inches in diameter, and stroke 15 inches, Wheels 4 ½ feet in diameter, boiler had 30 copper tubes 5 feet long 4 inches in diameter, connecting rods worked on double cranks in front axle. Weight of engine 4 tons. Engineer was John Hampson, an Englishman. The names of some of the excursionists were—Louis Benedict, James Alexander (Prest. Commercial Bank,) Mr. Dudly (Dudly Observatory) Jacob Hayes (High Constable) Major Maggs (Sheriff) Billy Winnis (Penny Postman Theodore Weed and ex Gov. Yates. / NIGHT WATCHMAN, Engine House, / Plane No 27, D. & H. R. R. & C. Co."

23. 1875:

J. A. Clark is an excellent historian, and his chapter on the *Stourbridge Lion* merits being given here in its entirety because it substantiates so many facts that relate to the history of the *Stourbridge Lion.*



THE

WYOMING VALLEY,

UPPER WATERS OF THE SUSQUEHANNA,

AND THE

LACKAWANNA COAL-REGION,

INCLUDING

VIEWS OF THE NATURAL SCENERY OF NORTHERN PENNSYLVANIA,

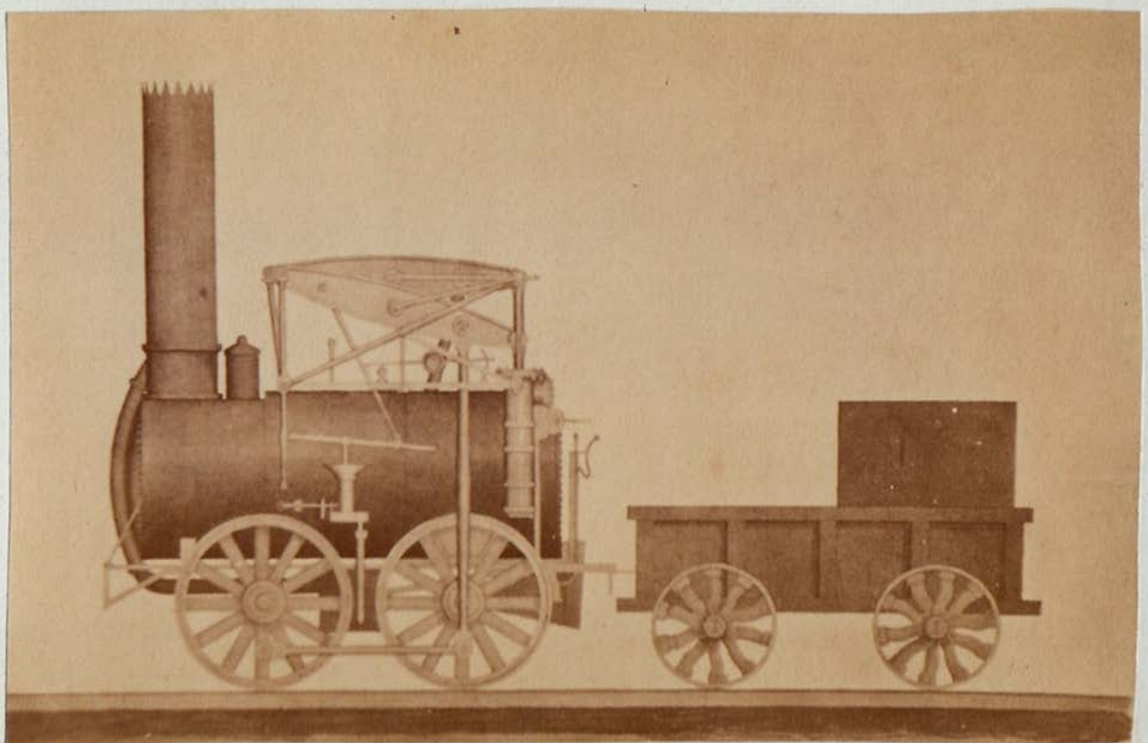
FROM THE INDIAN OCCUPANCY TO THE YEAR 1875.

PHOTOGRAPHICALLY ILLUSTRATED.

EDITED BY

J. A. CLARK.

SCRANTON, PA.:
J. A. CLARK, PUBLISHER.
1875.



THE STOURBRIDGE LION,

The First Locomotive Engine ever placed upon the track on the American Continent.
Purchased in England by the Delaware & Hudson Canal Company.

CHAPTER XVII.

THE "STOURBRIDGE LION"—THE FIRST LOCOMOTIVE EVER PLACED UNON A RAILROAD TRACK ON THE AMERICAN CONTINENT.

"Stern tide of human Time! through what mysterious change
Of hope and fear have our frail barks been driven!
For ne'er, before, vicissitude so strange
Was to one race of Adam's offspring given."

To Northeastern Pennsylvania is due the credit of introducing upon the American continent the first Locomotive ever placed upon a track, and the Delaware and Hudson Canal Company is entitled to all the honor which attaches thereto.

The pertinacity with which different parts of the country clamour for this distinction is remarkably ludicrous, and the many variegated pen pictures of the first locomotive engine are astoundingly presumptuous, yet well calculated to lead the reader astray.

It is proposed herein, to give the facts in such a form as will render the discernment an easy effort, still it will be attempted to make the search as thorough as space will allow.

Much confusion arises from the admission that railroads were built in other sections than in Northern Pennsylvania somewhat earlier, but the reader will please observe that railroads are by no means modern institutions; it is the steam motive power which is here claimed as applied to railroads which marks this section of country first in the order of events. The idea of moving heavy substances on tracks laid down was known and practiced, according to Diodorus Siculus, by the Egyptians at the building of the Pyramids. The railway proper, however, doubtless originated in the coal districts of the North of England and of Wales, where it was found useful in facilitating the transport of coals from the pits to the shipping places.

Next carts were used, and tramways of flagstone were laid, along which they were easily hauled. Then pieces of planking were laid parallel upon wooden sleepers, or imbedded in the ordinary track. In 1676 this practice of laying wooden rails had been extensively adopted. They were formed with a rounded upper surface, like a projecting moulding, and the wagon wheels being "made of cast iron, and hollowed in the manner of a metal pulley," readily fitted the rounded surface of the rails. These rude wooden tracks were the germ of the modern railroad. Soon thin plates of iron came to be nailed upon the upper surface of the rails, to protect the part most exposed to friction. From this arrangement the transition was natural to the system of cast iron rails, which were first laid in 1738, at Whitehaven, England, the power used being the horse, while the first successful engine built by the Stephensons did not appear until 1825.

Steam had been used prior upon the water, and was in use at this time upon the steamers plying upon the river Tyne.

Richard Trevethick's high pressure engine, if it may be termed a success, appeared February 21st, 1804, on the Merthyr tramway in Cornwall, Wales, but with this as with the many attempts of the Stephensons, the world was without a locomotive engine of endorsed availability until the prize of £500 offered by the Directors of the Liverpool and Manchester Railway, was carried off in triumph at the trial on the 6th of

October, 1829, by Stephenson's "Rocket."

The news of this triumph was received over the civilized world with joy, and nowhere with greater enthusiasm than in America, where were in construction two coal roads and two important railroads.

Quincy, Massachusetts, built the first railroad in the United States. It was three miles in length and extended from the granite-quarry of the place to the Neponset River. It was commenced in 1827, the rails being five feet apart, of pine, a foot deep, covered with an oak plate, and these were overlaid with flat bars of iron. The whole was built with granite sleepers, seven and a half feet long, laid eight feet apart.

The second railroad was built in the spring of 1827, extending from the coal mines in Mauch Chunk, to the Lehigh River, a distance of nine miles. The cars descended by gravity and were hauled up again by mules.

In the year following, 1828, the Delaware and Hudson Canal Company sought to connect their coal mines west and south of Honesdale with the canal, at the latter place, and during the year the road was completed.

On July 4th of the same year the first sod was broken for the Baltimore and Ohio Railroad, and before the same year closed the South Carolina Railroad was in process of construction.

Among the few enterprising men who repaired to Europe to witness the experiment of the different locomotives for the prize, were Mr. E. L. Miller, of Charleston, South Carolina, who was interested in railroad matters in his own quarter, and Horatio Allen, esq., late assistant engineer upon the Delaware and Hudson Canal and Railroad, who was also on a mission of interest for this part of the state. While in Europe, Mr. Allen received instructions from John B. Jervis, esq., the chief engineer of the Delaware and Hudson Canal and Railroad Company to contract for the iron for the road which had just been graded, and also for three locomotives.

"…to contract for the iron for the road which had just been graded, and also for three locomotives..:"

The instructions were carried out by Mr. Allen while in England, and after purchasing the first of the three engines, which was the "Stourbridge Lion," he ordered it shipped to New York, where it landed from the ship John Jay, at the wharf of the West Point Foundery Works, foot of Beach street, about the middle of May, 1829.

Here it was set up in the yard, and steam put to it from the works, where it was visited by thousands who flocked to see the wonder go through its motions.

The *Morning Courier* and *New York Enquirer*, of June 12th, 1829, contains the following notice:

"*Locomotive-Engines.*—We yesterday attended the first exhibition of a locomotive-engine, called 'The Lion,' imported by the Delaware and Hudson Canal Company, to be used upon their railway. On Wednesday the engine just imported was tried, and gave such general satisfaction, that the present exhibition was unanimously attended by gentlemen of science and particular intelligence. The engine was put up in Mr. Kimball's manufactory, by Horatio Allen, esq., who went to England to purchase it for the company, and it gives us great satisfaction to say that the most important improvements which have lately been made in the construction of these engines originated with him. It is nine horse power, having a boiler sixteen and a half eet long, with two cylinders, each of three-feet-stroke. It is calculated to propel from sixty to eighty tons, at five miles per hour. The power is applied to each wheel at about twelve inches from the centre, and the adhesive power of the wheel arising from the weight of the engine, will give locomotion to the whole structure.

"The engine [the Lion] was put up in Mr. Kimball's manufactory, by Horatio Allen, esq. .

"The steam was raised by the Lackawaxen coal, and sustained (although there was no friction) at between forty and fifty pounds to the inch.

"We were much delighted with the performance of the engine, and have no doubt that the enterprising company to whom it belongs will reap a rich reward for their enterprise and perseverance.

"Pleased as we were, however, with the engine, we were much more pleased with the practical demonstration offered, of the importance and usefulness of the coal which the company propose to bring to market. It is now reduced

to a certainty that the Lackawaxen coal will generate steam in sufficient quantity to answer all the purposes to which it is applied, and this fact is not only of great importance to the company, but it is worth millions to our State."

From the files of the *Dundaff Republican*, published at that village, in Susquehanna County, Pennsylvania, the following is found under date of July 23d, 1829, announcing the arrival of the "Stourbridge Lion" via. Delaware and Hudson Canal:

"The boats begin to arrive with the traveling engines and railroad machinery; all is bustle and business. The engine intended for this end of the road is a plain, stout work of immense height weighing about seven tons, and will travel four miles per hour, with a train of thirty to thirty-six carriages, loaded with two tons of coal each. The engine is called the 'Stourbridge Lion', its boiler being built something in the shape of that animal, and painted accordingly. Now imagine to yourself the appearance of that animal, the body at least twelve feet in length and five in diameter, traveling at the rate of four or five miles per hour, together with a host of young ones in train, and you will have some idea of the scene before us; but the enchantment is broken, and in a few days the whole will be set in motion, and we will now give you information that, when the whole is in operation, we shall give a general notice that we intend to hold a day of rejoicing on the completion of the same, and shall give a general invitation to our fellow-citizens to attend.

"We have procured a large cannon, and intend to station it on the top of the high peak, to sound on the occasion."

"A STRICT OBSERVER."

Horatio Allen, esq., who made the purchase in England, was the first to attempt to run it after being placed upon the track.

Horatio Allen's recollections, in 1851, of events in 1829

At a railroad celebration at Dunkirk, in 1851, which was the occasion of the completion of the New York and Erie Railroad, Mr. Allen made a speech, a portion of which has gone the rounds of nearly all the papers of America, and is as follows:

Horatio Allen describes the trial run of the *Stourbridge Lion.*

"Having occupied your time with these statements of perhaps no great interest, but the omission of which would have been an act of injustice, I have thought that, on this great railroad occasion, a reference to some of the incidents in the early railroad history of this country might be appreciated. To bring before you as strikingly as in my power, it has occurred to me to lead your imagination to the conception of the scene which would present itself if, on some fine morning, you were placed at an elevation, and gifted for the moment with a power of vision which would command the railroad movements of the whole United States. There would be presented an exciting picture of activity, in a thousand iron horses starting forth from the various railroad centres, or traversing the surface of the continent malldirections. When the imagination has attained to some conception of the scene, let us seek to go back to the time when only one of these iron monsters was in existence on this continent, and was moving forth, the first of his mighty race. When was it? Where was it? and who awakened its energies and directed its energies? It was in the year 1829, on the banks of the Lackawaxen, at the commencement of the railroad connecting the canal of the Delaware and Hudson Company with their coal mines, and he who addresses you was the only person on that locomotive.

"The circumstances which led to my being left alone were these: The road had been built in the summer, the structure was of hemlock timber, and the rails of large dimensions, notched on to caps placed far apart. The timber had cracked and warped, from exposure to the sun. After about five hundred feet of straight line, the road crossed the Lackawaxen creek on a trestle-work about thirty feet high and with a curve of three hundred and fifty or four hudndre feet radius. The impression was very general that the iron monster would either break down the road or that it would leave the track at the curve and plunge into the creek. My reply to such apprehension was, that it was too late to consider the probability of such occurences; that there was no other course but to have the trial

"After about five hundred feet of straight line, the road crossed the Lackawaxen creek on a trestle-work about thirty feet high and with a curve of three hundred and fifty or four hundred feet radius."

made of the strange animal which had been brought here at such great expense, but that it was unnecessary that more than one should be involved in its fate; that I would take the first ride alone, and that the time would come when I should look back to this incident with great interest. As I placed my hand on the throttle-valve handle, I was undecided whether I would move slowly or with a fair degree of speed; but believing that the road would prove safe, and prefering that if we did go down, to go down handsomely and without any evidence of timidity, I started with considerable velocity, passed the curve in safety, and was soon out of hearing of the cheers of the large assemblage present. At the end of two or three miles, I reversed the valves and returned without accident to the place of starting, having thus made the first railroad trip by locomotive on the Western Hemisphere."

Mr. Wm. H. Brown, author of "The First Locomotive in America," says of the "Stourbridge Lion" that "although the engine proved to be impracticable under the circumstances, it was caused by no defect in its construction, or the principle involved, nor from a lack of power and ability to perform all the duties that might have been required; but from this cause alone that the road had not been built to sustain such a weight as it was called upon to bear when this new instrument of power was placed upon it. The road had been constructed for horse-power alone, as all other roads were in this country at that early period, and for a long time after even in England. No idea of a locomotive had been conceived in this country."

Mr. David Mathew, who had charge of the men who were employed to fit up the engine when it arrived in New York, and had been landed at the works of the West Point Foundery, thus describes this early wonder:

"The 'Stourbridge Lion' was a four-wheeled engine, all drivers, with all four wheels connected by pins in the wheels. The boiler was a round, cylindrical one; no drop part for the furnace, and the smoke-box had a well painted lion's head on it. The cylinders were vertical, placed at the back, and each side of the furnace, with grasshopper-beams and connecting rods from them to the crank pins in the wheels. The back wheels and the side rods between them and the front wheels; the front end of the beams were supported by a pair of radius rods which formed the parallel motion. This engine was built by Foster, Rastrick & Company, at Stourbridge, England."

The engine was abandoned by the company because of the defect of the track, and for some time was housed under a rough shed, whence it was finally taken to be distributed in parts where it could serve some purpose. The boiler was put to use in Carbondale, and different parts were appropriated by individuals as relics.

Steuben Jenkins, esq., of Wyoming, the indefatigable antiquarian student, has in his vast collection of memorials one of the steam chests, while Mr. John B. Smith, of the Pennsylvania Coal Company, has the other at his home in Dunmore.

Parts of the *Stourbridge Lion* as souvenirs

The illustration which we give is a photograph from an India ink drawing of the original, which was executed expressly for this work by Cornelius Brinckerhoff, an architect and civil engineer of Scranton, whose ability and accuracy in all his works stamp him as eminently proficient, and upon whose skill we base our guaranty that the design is exact in every particular.

Before dismissing the subject of Locomotives, it is deemed judicious to copy herein an able article upon the railroads of the present day, and their prospects for the future, which appeared a few months ago in the New York *Independent*:

"No fact has had a wider influence upon the business and material progress of this country than the growth of railways within the last forty years. In 1829 there was scarcely a single mile of railway in all the land; and in 1830 only twenty-three miles of line were opened. In 1848 we had five thousand nine hundred and ninety-six miles of line completed, showing an average increase of three hundred and ten miles per annum, from the commencement. In 1860 the system had expanded to thirty thousand six hundred and thirty-five miles, advancing, for the previous twelve years, at the annual rate of two

thousand and fifty-three miles. The war greatly retarded this progress, especially at the South; and yet the aggregate addition, up to the end of 1868, was eleven thousand six hundred and forty-nine miles in eight years, averaging one thousand four hundred and fifty-five miles for each year, and giving a total of forty-two thousand two hundred and fifty-five miles for the whole country. In 1868 the increase was two thousand nine hundred and seventy-nine miles; which, with one exception, was greater than the increase of any previous year. During the past year the estimated increase is five thousand miles. Since, and including the year 1865, the year when the war closed, about thirteen thousand miles of railway have been constructed. The total mileage, as the figures now stand, amounts to forty-seven thousand two hundred and fifty-five miles.

"On January 1, 1869, the six New England States had four thousand and nineteen miles of railway, the six Middle States had nine thousand seven hundred and sixty-five miles, the ten Western States had sixteen thousand eight hundred and eighty-nine miles, the twelve Southern States had ten thousand six hundred and ninety-three miles, and the three Pacific States had eight hundred and eighty-nine miles of road. Pennsylvania was the 'banner' State as to railroad mileage—having four thousand three hundred and ninety-eight miles on January 1, 1869. Illinois stood next on the list, having three thousand four hundred and forty miles; and Ohio and New York were about equal, each having about three thousand four hundred miles. In proportion to the number of square miles of territory, Massachusetts was far in advance of any other State, having one thousand four hundred and fifty miles of road to seven thousand eight hundred square miles, or an average of one mile of road to every five hundred and forty-seven square miles—a ratio which if extended to the whole United States, would give six hundred thousand miles of railway. The cost of all these roads, as compiled at the close of 1868, was set down in round numbers at $1,850,000,000. Add the cost of the roads completed in 1869, at an average of forty thousand dollars per mile, and we have a total cost of $2,070,000,000, an amount nearly equal to the national debt. The aggregate tonnage of these roads in 1868 was about seventy-five million tons, valued at $10,472,250,000. This is equal to about six times their cost, and would pay four such national debts as the country now owes.

"Commissioner Wells, in his recent report, observes: 'If it is assumed that a line of railway gives access to fifteen square miles of country on each side of it, or thirty square miles altogether, then the thirteen thousand miles of railway which it is estimated have been constructed during the five years from 1865 to 1870 will have opened up three hundred and ninety thousand miles of what, for the purpose of general production, may be considered new territory—a tract of country larger than the whole area of France, and nearly three and a half times larger than the whole area of Great Britain.'

"Not only in the item of mileage, but also in construction and accommodation, has there been a great progress in our railroad system. Much better roads are being built than were formerly deemed necessary. Steel rails are taking the place of iron rails. The roads are much better equipped than formerly; more safe-guards are provided against accident, and fewer accidents occur in proportion to the amount of travel. Railway capitalists have discovered the folly and poor economy of hasty and imperfect construction, which, though cheaper at first, is more costly in the end. The multiplication of roads and their healthy competition with each other, have had a tendency to reduce their rates of fare and freight charges, and in this way serve the interest of community. Indeed, all the facts and statistics of the great railway interests of the country greet the new year with exceedingly inviting prospects for the future. The progress of the past, wonderful as it seems, will be entirely eclipsed by that of the next forty years."

24. June 25, 1880:

Article from the *Scranton Republican*, Friday, June 25, 1880, p. 2, about the *Stourbridge Lion:*

". . . he [Allen] bought for the canal company three engines. . ."

"A LOCOMOTIVE IN 1829 / DESCRIBED AS RESSEMBLING A VAST GRASSHOPPER . / The first engine to draw a railway train on this continent was run at Honesdale, Pa., August 8, 1829, on the newly-finished road connecting the Lackawanna coal fields with tide-water by way of the Delaware and Hudson Canal. This was the first road of any consequence in the Republic to adopt practically the economic system of inclined planes and gravity locomotion, since adopted by engineers wherever practicable. At that time railways were just beginning to attract the attention of capitalists. The Liverpool and Manchester road, the pioneer enterprise of the kind, had been for some time building, and was near completion. George Stephenson's experiments with steam machines for roads were watched throughout civilization with the deepest interest. In 1828 John B. Jervis, Chief Engineer of the Delaware and Hudson Canal, sent his assistant, Horatio Allen, to England to investigate the application of steam to land transportation. Allen became convinced that Stephenson's ideas were destined to revolutionize commerce, and <u>he, therefore, bought for the canal company three engines to be used on the initial railway in the United States</u> [emphasis added]. In May 1829, the first of the engines was landed here; was put together by Allen, and exhibited at the foundry for some weeks. It was queer-looking enough, having four wheels connected by side-rods. Vertical cylinders on each side of the rear end of the boiler communicated motion to a vast walking beam, attached to the side-rods of the driving wheels by other long iron rods. The engine was indeed, so covered with rods and joints that it resembled a vast grass hopper. Having been delivered at Honesdale in due time, Allen had it put on the track, consisting of hemlock rails, 8 by 10 inches thick, 4 feet 3 inches apart, and spiked to hemlock ties with 10 feet spaces between them. The engine weighed seven instead of three tons, as had been agreed upon; the rails had been warped, and as the road crossed the Lackawaxen river, after a sharp curve, on a slender hemlock trestle, which it was believed would not support the engine, Allen was besought not to imperil his life on it. He knew there was danger, but, ambitious to connect his name with the first railway in America, he determined to take the risk. He ran the engine up and down along the coal dock for a few minutes, and then invited some one of the large assembly present to accompany him. Nobody accepted, and pulling the throttle valve open, and saying good-by to the crowd, he dashed away from the village around the abrupt curve, and over the trembling trestle, amid deafening cheers, at the rate of 10 miles an hour. The Stourbridge Lion, as the engine was named, from its place of facture, was attached, after the trial, to trains of coal cars, and drew them satisfactorily on the docks. But it could not be employed to advantage on so slight a railway, which could not be fitted to the engine on account of expense required. The Lion was, therefore, placed in a shanty on the docks, and staid there for years. Finally, it was taken to pieces, its boiler being carried to Carbondale and put in a foundry, where it is still in use. <u>The other two engines shared the same fate</u> [emphasis added]. John B. Jervis is still living, at 80 and

upward, at Rome, in this state, and Horatio Allen, over 70, resides at Orange, N. J. What marvelous progress men of their age have seen in their day. –*N. Y. Times.* / [Hand written note at the conclusion of this article by D. Yarington. The note reads as follows: "I saw the Lion cross the trestlework spoken of above. / D. Yarington."

25. 1880:

Hollister (unpublished typescript, 1880), p. 44 and p. 44 (two pages numbered page 44 in succession) speaks on the question of the number of engines ordered in England by Allen:

". . . He [Horatio Allen] ordered three locomotives from England but brought but one (?)"

"The Railroad between Honesdale and Waymart was originally built as level as the country would permit, the coal cars being drawn back and forwards by strong horses. In the summer of 1828 Chief Engineer Jervis, sought to displace horse power by locomotives in the interests of speed an economy. <u>He ordered three locomotives from England but brought but one (?)</u> [emphasis added] The 'Stourbridge Lion' arrived in New York in May 1829, was put together in June of this year by Horatio Allen then Assistant Engineer upon the Delaware and Hudson Canal and Railroad, arrived in Honesdale July 23 on the Canal, where, as in New York it was an object of wonder curiosity and observation. / Its arrival in New York City was an event of such importance that the Morning Courier and New York Inquirer of July 12, 1829, gave minute description of its singular features and of its ability 'to propel sixty or eighty tons at five miles per hour, while the Dundaff Pa. Republican thus describes its appearance at Honesdale July 23, 1829. / 'The boats begin to arrive with the traveling engines and railroad machinery; all is bustle and business. The engine intended for this end of the road is a plain, stout work of immense height weighing about seven tons, and will travel four miles per hour, with a train of thirty to thirty-six carriages, leaded with two tons of coal each. The engine is called the 'Stourbridge Lion,' its boiler being built something in the shape of that animal, the body at least twelve feet in length and five in diameter, traveling at the rate of four or five miles per hours, together with a host of young ones in train, and you will have some idea of the scene before us; but the enchantment is broken and in a few days the whole will be set in motion, and we will now give you information that, when the whole is in operation, we shall give a general notice that we intend to hold a day of rejoicing and the completion of the same and shall give a general invitation to our fellow-citizens to attend. / We have procured a large cannon, and intend to station it on the top of the high peak, to sound on the occasion.' The engine was placed on the road and a trial trip was made August 8, 1829 by Major Horatio Allen, who ran the queer looking machine over the Lackawaxen creek on a long and curving hemlock trestling in safety and triumph amidst the cheers of a great crowd. A canon that had been placed on Irving's Cliff to aid the celebration burst and tore off an arm from an unfortunate gunner. / The non-adaptability of the railroad forbid the use of the locomotive which was abandoned and placed in a shed by the road side for many years. It deserved a better fate. Preserved in its integrity, it would have been a

century hence the greatest railroad relic of modern times. Its boiler is till utilized in Carbondale, while it two steam chests respectively find consideration, one at the home of Hon. John B. Smith, Supt. Penn Coal Co, Dunmore; the other with our antiquarian friend Steuben Jenkins, Esq., of Wyoming."

Stourbridge, England:

Durant: *Age of Voltaire,* 1965, speaking of mid-18th century England: “But the great centers of domestic commerce were the annual fairs held in London, Lynn, Boston, Gainsborough, Beverley, and, <u>above all, Stourbridge. There, every August and September</u> [emphasis added], a veritable city took form, with its own administration, police, and courts; nearly all products of English industry could be found there, and manufacturers from all over the island met to compare prices, qualities, and woes.” (p. 55) The great merchants were now rivaling the old landowning aristocracy in riches and power. The merchants who managed trade controlled the lives of their communities. The shippers ruled Liverpool; the coal owners dominated Newcastle. Money was replacing birth as a title to power.”

26. 1880s:

In the eighties, *Stourbridge Lion* was located in the foundry yard of Lindsay and Early, Carbondale.

27. September 1881:

Horatio Allen visit to Honesdale:

In September 1881 (52 years after he test drove the *Stourbridge Lion* in 1829), Horatio Allen, accompanied by his wife and daughter, visited Honesdale. In the *Honesdale Citizen* of September 29, 1881, we read:

“Mr. Allen, who now resides in South Orange, N.J., arrived in Honesdale last Saturday [September 24], by a special car on the gravity road, accompanied by his wife and daughter. The car stopped near the point at which the historic trip [of the *Stourbridge Lion]* commenced. The hero of that event, looking around at the once familiar ground, compared his position to that of Rip Van Winkle on awakening after his twenty years sleep. The contour of the surrounding country remained much the same, though shorn of the heavy forest which aforetime had covered it. But half a century ago the streets which now spread before existed only on paper, and the buildings now lining them were yet to come.”

In the *Honesdale Citizen* of September 29, 1881, we also read:

Horatio Allen: "I found a request that I should undertake the purchase of iron for the canal company's road at Honesdale, and also, the plan and arrangement for the transportation from England of three locomotives The whole matter was left entirely to me."

"HORATIO ALLEN. / The Man who Ran the First Locomotive on This Continent Visits Honesdale and the Spot where He Put the Engine in Motion—An Interesting Narrative of the Event from His own Lips—Hale and Hearty at the Age of Four Score Years. / One of the events of great interest occurring here during the past week was the visit of the venerable Horatio Allen to view the spot where he had, 53 years ago, run the first locomotive on the American continent. Both to himself and the citizens of Honesdale, his visit here was one of rare and peculiar interest. But few of our people were aware that the genius who first awakened and contributed so largely to directing the energies which brought out the locomotive was yet alive. The announcement that he was among us brought to our community a thrill of pleasant surprise, and scores of our citizens, conspicuously among whom were the older residents, crowded about him at the hotel to listen to the story as it fell from his own lips how the first iron horse was brought to this side of the Atlantic and by him bridled and managed. This was only a little more than five decades ago, and now the echoes of the valleys and hills of almost every part of the globe are awakened by the shrill whistle of the locomotive, civilization's most potent advancing power. Mr. Allen was born in Schenectady, May 10th, 1802, consequently if he lives until next May he will have attained full four-score years. <u>The vigor of his physical and mental powers is remarkable</u> [emphasis added], and his well preserved life is a grand example of the fruits of a strictly temperate career. His father, a native of Rhode Island, and of Scotch Irish decent, was professor of mathematics in Union College. Mr. Allen upon being asked the secret of his longevity, related a very entertaining reminiscence of his early life, connected with which was a proverb which he had always borne in mind.—'Let him who drinketh, drink no more; and him who eateth, eat less.' Whether these are words of Solomon or Mr. Allen we shall leave the reader to determine by scriptural research. If it is not in the proverbs of holy writ, it is certainly worthy of a place there. It would furnish an excellent guide to thousands of the present day who, notwithstanding the light that science and experience have furnished as a signal to deter the unwary from the course of vicious indulgence, are digging their graves with their teeth and their appetites for strong drink. The secret <u>of Mr. Allen's long life, well preserved physical powers and mental facilities</u> [emphasis added], has the force of a mathematical demonstration, and affords a beacon on the sea of life to which all might steer with safety. / At the close of the exercises in the Park on Monday afternoon, C. S. Minor, Esq., introduced Mr. Allen to the audience and he related to a great throng of eager listeners the following interesting narrative. / When I was resident engineer on the line of the Delaware and Hudson Canal in 1828, I saw from the various periodicals that I was taking, that an entirely new era in transportation was about opening to the world, and I deliberately resigned my position on the canal to go to England to possess myself of some knowledge in detail, of railroad matters. But before going there, as I had

not visited the capitol of my own country or Niagara Falls, I thought to visit them first. On my return to New York from visiting the places above, I found a request that I should undertake the purchase of iron for the canal company's road at Honesdale, and also, the plan and arrangement for the transportation from England of three locomotives. The whole matter was left entirely to me. [emphasis added]. In England I carried out my intentions on the subject, and I found on the Stockton and Darlington coal road, some sixteen miles in length, the only locomotive running in England. It was the use of locomotives on that road that led Mr. John B. Jervis, the Chief Engineer of the D. & H. Company to adopt locomotives for his coal road. In due time, the iron and locomotives were made. The first locomotive was received, and set up, or rather blocked up, in the Merchants yard in New York. The 'Stourbridge Lion,' another locomotive was sent up to Rondout in the summer of 1829, and from there it was sent to Honesdale by the canal. / I came to Honesdale and superintended the removal of the locomotive from the canal to the road bed and putting it in operation. When the time came for the running of the engine, there was, on the part of a great many, great fear about the engine keeping the track. I therefore said that as no more lives than necessary should be endangered, I will make this trip alone—I will take all the risk. I had never run that locomotive or any other engine before in my life, and I have never run a locomotive or any other engine since—but I did run that one. As I had every confidence in the engine and in the road, I did not hesitate to move, and to move off at a good speed too, and gave steam accordingly. I reached the curve safely, where the danger of the engine leaving the track was expected, and soon turned it with perfect success. The only incident of the trip was the creaking of the track, which, as the locomotive came along settled the timbers to their bearings. My recollection is that I ran about three miles up the track, but perhaps I did not go quite so far. I reversed the engine and started back. On the return trip the road worked very much better than in going up—it had settled somewhat. In looking back at my experience with that engine I am surprised that I brought it back to the place where I started from; but I stopped at almost the exact spot from where it was first started. This was in August, 1829. / I made arrangements that summer to go to Charleston and take charge of the building of the first long railroad in this country, which was to run from Charleston, South Carolina, to Augusta, Georgia. That took up my time and attention until 1834, but the road was finished in 1833, and was 136 miles long. That was the first locomotive road in the world used for the transportation of freight and passengers. The first time an engine ran 100 miles was upon this road. The road had no formal opening, but was put in operation in 1833, and it is in operation to-day. It was called the South Carolina Railroad. / My earliest recollection of Honesdale is of having my quarters in a shanty which was erected for the engineers in the midst of beech woods, which I now understand was near the confluence of the Lackawaxen and Dyberry. There was but one other house, and that, I think, was owned by Mr. Torrey. The spot on which Honesdale now stands was then a dense laurel swamp, surrounded with beech forest. This was fifth-three years ago. My work, as resident engineer, on the canal was on the section between Honesdale and Lackawaxen. I think I was engaged at it over a year. / In regard to the South Carolina Railroad, I would say that soon after my taking charge of that work it became necessary to decide for what power the road should be built, and it was a debatable subject and the state of things peculiar. On the other side of the

water the Liverpool and Manchester road had been built without deciding what power they would use, and it was under such great discussion that they finally referred the subject to two eminent English engineers, with directions to make full and expert examination and to report their opinion as to the power to be used on that road. They made a thorough examination and a very full report on the subject and concurred in their judgment that the Liverpool and Manchester Company should built their road to be run by stationary engines and long ropes. That was the state of things on the English side of the water. There were others who were advocates of the locomotive, but that was the report of these engineers. On this side of the water the Baltimore and Ohio Company had built their road and, following the idea of the Liverpool company that locomotives were not adaptable to the railroad, they had about decided to work their road by horse power. They laid the case before me, as a young engineer, and I reported in favor of the locomotive; but I told them they must not adopt the locomotive on my suggestion; that they could use horse power, but that the South Carolina railroad was going to use locomotives, and, after much consideration, I had arrived at this conclusion that locomotive power should be given the preference. Because, I said, there is no man living who knows what the breed of the locomotive is to be; and that was the first time in the world that a road for general passenger and freight purposes was decided to be built for locomotives. Within six months my predictions were verified, because the Liverpool and Manchester company offered a reward for the best engine produced, on the condition that the locomotive should draw three times it own weight at a speed of ten miles an hour! Those were the conditions that brought about what is known to engineers as 'the great trial of locomotives,' in 1839, in England. It was only a few months after I said that the man was not living who could tell what the locomotive would do, before this reward brought out locomotives that traveled forty miles an hour, and from that time the locomotive question was settled. / Very soon after my connection with the Erie railway I became convinced that on any railroad it would be necessary to have greater power than could be furnished on four wheels with safety to the road, and that eight-wheel engines were indispensibly [sic] necessary to the future of railroads. At that time such a thing as an eight-wheel engine was unknown. There were two English speculators who thought it out of the question for the young American engineer to devise an eight-wheel engine. It took the whole winter before I got authority to build the eight-wheel engines. Finally I got authority to build, and the first eight-wheel engines built were put in operation on that road, and they were built in this country, at the West Point, N. Y., foundry. Afterwards, while in Baltimore, I saw some eight-wheel cars, and the gentleman who claimed to have invented them is said to have spent a quarter of a million of dollars in prosecuting his claim. My eight-wheel engine upset the whole thing. / It has always been a wonder to me as well as others that when the Liverpool and Manchester road was built that they carried with them the four feet eight and a half inch gauge instead of adopting five foot gauge. The coal roads necessarily were confined to a four feet eight and a half inch gauge, as the entrance to their mines would not admit of five feet track. Other roads building adopted the coal road gauge, and from the simple fact of the lead of these roads, was established the four feet eight and a half gauge, which eventually will be the gauge of all the world. / I will not say much about my connection with the Erie road. It is rather a curious history. I have been in every position on that road almost. I have been President, and at one time during the absence of the Chief Engineer I acted in that capacity; another time I was consulting engineer, and I was also one of the

commission of seven who put that road where it ought to be in the Valley of the Delaware. / On the morning after his arrival here, Mr. Allen took a walk alone over the spot where he ran the 'Stourbridge Lion,' and in the afternoon Mr. Coe F. Young conveyed him in his carriage to the place where he reversed the engine. The track at that time ran on the north side of the Lackawaxen as far as Prompton, and the point where Mr. Allen reversed the engine is where the highway crosses the Lackawaxen, just below the falls at Seelyville about one mile and a half from Honesdale. / On Tuesday morning, through the courtesy of Mr. Coe F. Young, general manager of the D. & H. Canal Co., Mr. Allen, his wife and daughter, in company with the members of the Press and a number of the old residents of Honesdale who were present when Mr. Allen made his trip on the 'Stourbridge Lion,' were given the pleasure of an excursion over the Gravity on a special train. It was a delightful morning and had the weather clerk ordered the atmospheric conditions they could not have been more propitious. The trip was charming. / Mr. Allen and family left Honesdale on the Erie five o'clock Tuesday evening train for their home at East Orange, N. J. We are pleased to learn that it is his intention to spend a portion of next summer in this locality."

Photograph of Horatio Allen by Bodie at the time of Allen's visit to Honesdale in 1881. This photo is given in Leslie, *Honesdale and the Stourbridge Lions,* p. 122.

Picture Credit: *Wayne County Historical Society*

Plate X: Horatio Allen at the time of his visit to Honesdale in 1881. Mr. Allen was then over seventy-nine years of age. The J. A. Bodie Studio where this picture was taken was in the Keystone Block, a structure which stood opposite the western end of Seventh Street.

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From *Leslie* (p.66) we learn these additional facts about Horatio Allen's visit to Honesdale in the autumn of 1881:

"Horatio Allen also addressed an audience in Central Park while in Honesdale. This was something of a fortuitous event since the occasion was a memorial program related to the death of President James A. Garfield who had been shot July 22, 1881, and died September 19. At the close of the formal program, C. S. Minor, Esq., introduced Mr. Allen who then told 'a great throng of eager listeners' about his purchases of locomotives in England about the testing of the Lion in 1829."

In commenting on the public statements made by Horatio Allen, vocally and in print, at the time of this 1881 visit to Honesdale, Vernon Leslie in footnote No. 15 (p. 80) of his enlarged edition of *Honesdale and the Stourbridge Lions* (1994) notes: "There is so much duplication of phrasing in the various Allen accounts that one is led to believe that he either had an excellent memory or kept close copies of his statements."

Horatio Allen's excellent memory was frequently recognized by his contemporaries.

28. October 14, 1881:

In the October 14, 1881 issue (p. 4) of the *Carbondale Leader* there is that article titled "THE FIRST LOCOMOTIVE." Here is that article:
"THE FIRST LOCOMOTIVE. / The venerable Horatio Allen, who recently visited Honesdale, gives, in the local papers of that town, the following account of the trial trip of the first locomotive run in the United States: / When I was a resident engineer on the line of the Delaware and Hudson Canal in 1828, I saw from the various periodicals that I was taking, that an entirely new era in transportation was about opening to the world, and I deliberately resigned my position on the canal to go to England to possess myself of some knowledge in detail of railroad matters. But before going there, as I had not visited the capital of my own country or Niagara Falls, I thought I would visit them first. On my return to New York from visiting the above places, I found a request that I should undertake the purchase of iron for the canal company's road at Honesdale, and also the plan and arrangement for the transportation from England of three locomotives [emphasis added]. The whole matter was left entirely to me. In England, I carried out my intentions on the subject, and I found on the Stockton and Darlington coal road, some sixteen miles in length, the only locomotive running in England. It was the use of locomotives on that road that led Mr. John B. Jervis, the Chief Engineer of the D. & H company, to adopt locomotives for his coal road. In due time, the iron and locomotives were made. The

first locomotive [not the SL] was received [In the D&H's centennial flyer *(A Century of Steam Locomotive Development)* published on August 8, 1929, it is reported that the SL was shipped from Stourbridge, England in February 1829 and reached New York on May 13, 1829; it cost the Company delivered in New York, $2,914.90; it was sent up the Hudson River to Rondout and by canal to Honesdale, reaching there late in July 1829] and set up or rather blocked up, in the Merchants yard in New York. [In the *Dundaff Republican, and Canal & Rail Road Intelligencer* of June 18, 1829, on page 3, an article is reprinted there from the *Milford Eagle* titled *'Locomotive Engine.'* Here is that article: *"From the Milford Eagle / Locomotive Engine.*--We <u>yesterday</u> [emphasis added] attended the first exhibition of the Locomotive Engine called 'The Lion,' imported by the 'Delaware and Hudson Canal Company,' to be used upon their railroad. On Wednesday the engine first imported [the first one to arrive in America, not the SL, but the one that was set up/blocked up in the Merchants yard in New York] was tried, and gave such general satisfaction that <u>the present exhibition</u> [of the SL; emphasis added] was numerously attended by gentlemon [sic] of science and practical intelligence. It [the SL] is of nine horse power having a boiler16 1/2 feet long, with two cylenders [sic], each of three feet stroke.--It is calculated to propel from 60 to 86 tons at five miles per hour. The power is applyed to each wheel at about twelve inches from the centre, and the adhesive power of the wheel, arrising the whole structure. The steam was raised by the *Lackawanna* coal, and sustained (although there was no friction) at between forty and fifty lbs to the inch. / We were delighted with the performance of the engine, and have no doubt that the enterprising company to whom it belongs will reap a rich reward for their enterprise and perseverance.--Pleased as we were, however, with the Engine, we were much more pleased with the practical demonstration offered of the importance and usefulness of the coal which the company purpose bringing to market. It is now reduced to a certainty that the Lackawanna coal will generate steam in sufficient quantity to answer all the purposes to which it is applied, and this fact is not only of great importance to the company, but is worth millions to our state." *(Dundaff Republican, and Canal & Rail Road Intelligencer,* June 18, 1829, p. 3) The 'Stourbridge Lion,' <u>another locomotive</u> [emphasis added by SRP] was sent up to Rondout in the summer of 1829, and from there it was sent to Honesdale by the canal. / I came to Honesdale and superintended the removal of the locomotive from the canal to the road bed and putting it in operation. When the time came for the running of the engine there was, on the part of a great many, great fear about the engine keeping the track. I therefore said that no more lives than necessary should be endangered, I will make this trip alone—I will take all the risk. I had never run that locomotive or any other engine since—but I did run that one. As I had every confidence in the engine and in the road, I did not hesitate to move, and to move off at a good speed too, and gave steam accordingly. I reached the curve safely, where the danger of the engine leaving the track was expected, and soon turned it with perfect success. The only incident of the trip was the creaking of the track, which, as the locomotive came along settled the timbers to their bearings. My recollection is that I ran about three miles up the track, but perhaps I did not go so far. I reversed the engine and started back.

On the return trip the road worked very much better than in going up—it had settled somewhat. In looking back at my experiences with that engine I am surprised that I brought it back to the place where I started from; but I stopped at almost the exact spot from where it was first started. This was in August, 1829."

29. February 10, 1883:

Article about the *Stourbridge Lion* from *Scientific American Supplement*, No. 371, February 10, 1883):

"Horatio Allen was appointed by the Delaware and Hudson Canal Company to purchase three locomotives in Europe. . .".

"[National Car Builder] / **EARLY AMERICAN LOCOMOTIVES AND RAILROADS.** / The first railroad built in America appears to have been at Quincy, Mass., in 1826. It was three miles long. In 1827 another was built for the use of the coal mines at Mauch Chunk, Pa. It was nine miles long, and was operated by mules. In 1828, the Baltimore and Ohio, South Carolina and the Delaware and Hudson Canal Companies each built a road, all of which were operated by horse power. . . <u>Horatio Allen was appointed by the Delaware and Hudson Canal Company to purchase three locomotives in Europe</u> [emphasis added]. The 'Stourbridge Lion' was the first of the three that arrived, and it was the first locomotive brought to America. . . On the 8th of August, 1829, it was tried on the road at Honesdale, Pa. Its boiler was 16 ½ feet long, and the two cylinders were 3 feet stroke. Mr. Allen, on the date mentioned, started the engine, running it around a curve and up the road about two miles and then returned to the place of starting. This experiment demonstrated that the track was not sufficiently substantial for so heavy an engine, its weight being 7 tons. It was housed beside the track, where it remained for fifteen years, when the boiler was removed to Carbondale and used for stationary purposes and the remainder sold for old iron. Thus the first locomotive was a failure. In September, 1829, one of Geo. Stephenson's engines arrived in New York, and was jacked up clear of the rails and run. . . ." (*Scientific American Supplement,* No. 371, February 10, 1883)

30. 1883:

Horatio Allen's Trip to England, 1828, as Remembered by Horatio Allen in 1883:

The following article, signed by L. G., about the trial run of the Lion on August 8, 1829, was published in the Philadelphia *Press*, and reprinted in the *Carbondale Advance* of February 3, 1883, p. 2:

"Relying on Allen's judgment, Chief Engineer Jervis commissioned him to buy three locomotives for use on the pioneer railroad of America."

"THE FIRST LOCOMOTIVE. / Honesdale's Prior Claim to the Revolutionizing Iron Horse. / Horatio Allen's Wonderful Journey of Fifteen Miles an Hour over a Shaking Trestle—The Trial Trip of the 'Stourbridge Lion.' / ***From the Phila. Press.*** / HONESDALE, Jan. 27.—The successful application of steam as a motive power on railroads has always been dated from the trial of Stevenson's 'Rocket' on the Liverpool and Manchester Railway, in England, on the 14^{th} of October, 1829, while, as a matter of fact, the idea was demonstrated to be a grand success in a then wild and isolated part of the United States more than two months before the trail mentioned was made. On the 8^{th} of August, 1829, the first locomotive that ever turned a driving wheel on a railroad track was run at Honesdale, on a newly finished road that connected the Lackawanna coal fields with tide water by way of the Delaware and Hudson Canal. This road was the first of any commercial importance ever built in this country, and it brought into practical use the economical system of inclined planes and gravity locomotion, which has since been adopted by engineers wherever practicable. / Up to the time of the finishing of this gravity road over the Moosic Mountains, which separated the Lackawanna and Lackawaxen Valleys, there were but twelve miles of railroad in operation on this continent. Three miles of track had been laid in 1827 between Boston and the Quincy granite beds for the more convenient hauling of stone from the quarries; and the coal mine at Summit Hill, Carbon County, was connected with the Lehigh River by nine miles of railroad on the inclined-plane system, operated by mule power, in 1828. The railroad over the Moosic Mountains was sixteen miles long, Carbondale being the mine terminus, and Honesdale the Eastern terminus and the head of the canal, which extended to Rondout, N. Y., on the Hudson River. It was through the earnest and persistent efforts of William and Maurice Wurts, of Philadelphia, that the road from Carbondale to Honesdale was built. / INTERESTING CAPITAL. / The commencement of operations in the Lehigh Valley, which possessed easier and much cheaper means of transportation, turned the attention of the Wurtz Bros. to New York as their prospective market, and the Delaware and Hudson Canal and Railroad, in its day the most gigantic engineering project supported by a private corporation ever undertaken was the result. About this time railroad building was just beginning to awaken interest among capitalists. The first enterprise of the kind, the Liverpool and Manchester Railway, in England, had been for some time in process of construction and was approaching completion. George Stevenson, the father of steam locomotives, was then bringing to bear upon the managers of that new road his most telling arguments in favor of the introduction of steam as the motive power upon the road. His interesting experiments with his machines had attracted attention in America, too, and, pending the decision as to whether steam should be used upon the Liverpool Road, John B. Jervis, founder of the city of Port Jervis, N. Y., and Chief Engineer in the construction of the Delaware and Hudson Canal, sent Horatio Allen, his assistant, to England in 1828, to examine into the merits of steam as applied to railroad transportation. Mr. Allen was very young, and he was convinced that Stevenson's idea was

destined to revolutionize all branches of commerce. Relying on Allen's judgment, Chief Engineer Jervis commissioned him to buy three locomotives for use on the pioneer railroad of America [emphasis added]. / At this time Stevenson was head over heels in work preparing his subsequently famous engine, the 'Rocket,' for the coming trial of steam machines on the Manchester and Liverpool Railway, the managers having decided, after a long wrangle, to adopt steam power, and having offered prizes for the most successful locomotive as to speed and draught capacity. Mr. Allen was, therefore, unable to get Stevenson's services in the construction of the locomotives wanted for America, so he made a contract with Foster, Raswick [sic] & Co., machinists, of Stourbridge, to build the three engines [emphasis added]. The contract provided that 'the machines should be four tons weight,' Mr. Allen furnishing the drafts [emphasis added]. / A SINGULAR MACHINE. / In May, 1829, the ship John Jay delivered the first of these engines in New York City. The different pieces of machinery [emphasis added] were taken to the 'West Point Foundry,' [see article below on West Point Foundry from the *BLHS Bulletin*, September 2016] at the foot of Beach street, where young Allen put the machine together [emphasis added]. It was raised upon blocks, so that the wheels cleared the ground and the machinery was set in motion by steam generated over a fire made out of anthracite coal from the mines in the Lackawanna Valley, the cars from which the engine was intended to haul. The 'engine,' as it was then called [Note that it was not called the *Stourbridge Lion* when it arrived in America, rather, simply "the engine"], was exhibited at the foundry for six weeks, and was seen by thousands of people. It was a singular machine. There were four wheels, which were connected by side rods. Vertical cylinders on each side of the rear end of the boiler communicated motion to a huge walking beam, connected with the side rods of the driving-wheels by other long iron shafts or rods. The engine was literally covered with rods and joints and looked like a huge grasshopper preparing to leap. There was an engineer's cab and the smoke-stack was very small—not much larger than a stovepipe—and very high. / The engine was sent to this place [Honesdale] by canal, arriving here [Honesdale] on the 23d of July 1829 [emphasis added]. Everything was not in readiness for the trial trip until August 8th. Mr. Allen himself set the engine up and it was put on the 'tracks' at the company's docks. The primitive railroad track at that time consisted of hemlock rails eight by ten inches in thickness, placed four feet ten inches apart and spiked to hemlock ties, which were laid on the ground, with a space of ten feet between them. Ballasting and grading were unheard of. The timber had not been well seasoned, and, having been laid in summer, the rails were considerably warped and twisted before the eventful day of the trial trip arrived. There was another drawback/ After leaving the coal docks the railroad turned Westward by a curve of threatening radius, and crossed the Lackawaxen River on a slight hemlock trestle, 120 feet [trestle as 30 feet above the Lackawaxen] above the bed of the stream. The locomotive was found to weigh seven tons, instead of four, as the contract stipulated. The impression [portions of the next nine-lines of the article broken and missing in the copy of the *Carbondale Advance* in question in the collection of the Carbondale Historical Society. The gist of the missing portion of the text is that given the dangers involved in running the engine on this trial run, Horatio Allen decided to take the throttle himself, let the

consequences be what they might.] / In those days Honesdale—now the wealthiest borough in the State—had but a few hundred inhabitants, having been founded but three years previously, but every inhabitant was out in holiday garb on the 8th of August, 1829, to see the trial trip of the 'Stourbridge Lion,' as the engine was called [after its arrival at Honesdale]. It derived its name from the place where it was made, and from a fierce lion's head which was painted in red on the front of the boiler. The day was one long to be remembered. All the farmers within a radius of forty miles came to town, and an old Queen Anne cannon was brought from New York for the occasion. After firing up the locomotive, Mr. Allen ran it backward and forward for a few feet on the coal docks, and after inviting some friends to accompany him, he shouted 'good-bye' to the crowd, and, pulling the throttle-valve wide open, the engine went dashing away around the abrupt curve and across the shaking trestle at the rate of 15 miles an hour. The locomotive was run for several miles up the track, after which Mr. Allen ran the machine back to Honesdale, where he was greeted with applause and the firing of cannon. / After the trial trip[in a second test run in September] the engine was attached to trains of coal cars and handled them very satisfactorily. The railroad, however, was soon found to be of too slight construction to permit further use of the engine, and the straightened financial condition of the company at that time [emphasis added] made it impossible to purchase iron rails, so the 'Stourbridge Lion' was put in a shanty on the dock, where it remained for years, a prey to rust and decay. Its boiler was finally taken to Carbondale, where it was used for a long time in a foundry. The rest of the machine was sold for old iron, and hacked to pieces by relic-hunters. The other two locomotives [besides the *Stourbridge Lion]* were never used, nor were they ever put up [emphasis added]. / Horation [sic] Allen, the pioneer engineer, is still alive, hale and hearty, although he is 84 years old, and during a recent visit to this place he narrated the incidents of the eventful trip with great gusto. Mr. Allen was a relative of Capt. E. A. Ayres, the conductor who first introduced the bell-rope, now one of the most important attachments to railroad trains. L. G." *(Carbondale Advance,* February 3, 1883, p. 2)

Horatio Allen read the above article in the Philadelphia *Press*, and wrote a letter to the New York *Evening Post* in which he commented on that Philadelphia *Press* article. A copy of that issue of the New York *Evening Post* was sent from New York by George R. Love, Esquire of New York to the *Carbondale Advance,* which published Love's letter of transmittal to the *Carbondale Advance* and Horatio Allen's letter that was published in the New York *Evening Post*.

In the *Carbondale Advance* of February 24, 1883, p. 3, we read:

"THE FIRST LOCOMOTIVE. / It is a thoroughly demonstrated fact that the first locomotive ever run in America was the 'Stourbridge Lion' at her trial trip in Honesdale. This has been several times shown in our columns. Two weeks since we published an interesting article on the subject from the Philadelphia *Press* [given here immediately above], and we are now under

obligations to our excellent friend, Geo. R. Love, Esq., of New York, for a copy of the N. Y. *Evening Post,* containing a recent letter written only last week, from Horatio Allen, Esq., the agent, engineer and principal actor on the important occasion, to correct some errors that have crept into the published accounts [emphasis added]. / Mr. Love writes as follows: / **New York, February 17, 1882**[should read "1883"]. **/** I have mailed you a copy of the N. Y. *Evening Post* containing recent letter of Horatio Allen in regard to the first locomotive. To me the matter is exceedingly interesting when I associate with the record the fact that my father was on the spot and saw Mr. Allen raise the throttle valve to go on his perilous trip; as well also that my brother John afterwards (about 1850) bought either the Stourbridge Lion or its companion [the Pride of Newcastle], and converted it into a stationary engine where but a few years since I saw it doing its work in pumping the water of a coal shaft at Pittston, Pa. [emphasis added] GEO. R. LOVE. / **THE FIRST LOCOMOTIVE. / Mr. Horatio Allen's Account of the Honesdale Experiment.** / *To the Editor of the Evening Post: /* Sir: The *Evening Post* of February 10th contains an article (republished from the Philadelphia *Press)* headed 'The First Locomotive,' which, in the main [is] true, [but which] is incorrect and incomplete in so many particulars that, being published in New York, where I am personally known to so many, I ask the opportunity to correct and make more complete. / In the first place, it is not true that I was sent to England by any one [emphasis added]. Being a resident on the Delaware and Hudson Canal, and taking periodicals that kept me informed as to what was going on abroad in matters connected with my profession of civil engineer, I was among the first civil engineers in this country who saw the new era that was coming, and I decided to resign my position of resident engineer on the canal, not having had any position on the railroad, and to go to England at my own expense to study the facts as they existed at the time, and I take the liberty of adding that I anticipated at that early day what was to take place, as I know now what has taken place, and the end is not yet. At the time of my resignation, I had not visited the capital of my country nor its great object of natural scenery, Niagara, nor Boston, where there existed a three-mile quarry railroad, a railroad formed of wooden rail capped with iron, operated by horse power. I gave myself two months to make these visits. On returning to New York, I found most agreeably, to my surprise, that on the recommendation of my good friend, J. B. Jervis, I was to be entrusted with authority to have constructed three locomotives [emphasis added], and also to contract for the railroad iron for the railroad from the termination of the canal at what was afterward Honesdale, across Moosic Mountains some sixteen miles, to the coal fields on the Lackawanna, a tributary of the Susquehanna. In accordance with my original intention, I passed some eight months in search of the information desired—one month on the Stockton and Darlington road, on whose sixteen miles were in use the only locomotives in the world, and one month at Newcastle, the then center of interest and information in reference to the incoming era. Greatly would I rejoice if I had then

committed to paper not merely what I then saw, studied, and learned, but what I anticipated in the future. / **THREE ENGINES. /** Two of the engines which I ordered were from Stephensons, of Newcastle, by whom had been furnished the plans of the locomotive used on the Stockton and Darlington Railroad, and one from Foster, Rastrick & Co., at Stourbridge. The three engines were the first departure from the inefficient steam-making locomotives of the Stockton and Darlington Railroad. [emphasis added]. Foster, Rastrick & Co., used riveted flues of five inches diameter, and the Stephensons the lap-welded tube, the great feature of the locomotive of this day. It was one of the Stephenson engines that was set up in New York, and not the Stourbridge Lion. Of this engine it is of interest to say that it was the prototype of the Rocket, the engine that at the great trial in October, 1829, settled the question in England as to the use of the locomotive for the transportation of passengers and general freight. I say in England because, as I shall show, it was practically first decided in this country before the trial in England referred to. On the arrival of the Stourbridge Lion it was sent to the Delaware and Hudson Canal, and in the spring was sent by canal to Honesdale—the Stephenson engine remaining in New York [emphasis added]. / When the time came for placing the Stourbridge Lion on the track of the railroad at Honesdale, I was not in the service of the Delaware and Hudson Canal Company, being under an engagement to go to South Carolina in the fall to build the South Carolina Railroad, expected to be 150 miles long. Being at liberty, I volunteered to go to Honesdale and take charge of transferring the locomotive from the canal boat to the railroad track, some eighteen feet above its level. The description of the track, with the construction of which I had not any thing to do, is not entirely correct; but the incorrectness in not important [emphasis added]. When the time came that the locomotive was ready, the opinions of the lookers-on were divided as to whether the road would fail to carry the locomotive to the curve on the trestle-work, thirty-five feet high, or whether, reaching the abrupt curve, it would not certainly leave the track and be dashed to the bed of the creek. The decision was readily made by me, that it was not necessary to subject the life and limbs of more than one person to peril, whatever it might be; and that as I was the active instrument in the successive steps that had led to this running of a locomotive on a railroad on this continent, I would incur that risk in the undertaking. And therefore, alone on the locomotive, I took the throttle-valve handle in hand, and although I had never run a locomotive before, as I have never run one since, I did run that locomotive for three miles into the woods of Pennsylvania. And, what is perhaps a remarkable circumstance, having no brakeman and no experience in the management, I brought the engine back to a standstill at the place of beginning. / THE GRAVITY SYSTEM. / In explanation of the non-use of this engine or of the Stephenson engine, I know nothing. More than fifty years passed before I again visited the scene of my first trial. As an engineer, I was anxious to see the circumstances that originated the gravity system of railroads, by which the loaded and unloaded cars were moved by the power of gravity in both directions. One look at the lay of the mountain side extending down to the head of the canal made it plain that had the gravity system then been at command, the

sound of the steam locomotive would have never been heard in that valley. The gravity system stands at this day a monument to the engineering ability of James Archbald, who created the combination whereby the power of gravity runs the trains in both directions. It is a pleasure to recall that he commenced his engineering life in my party on the canal [emphasis added]. / Coming now the interesting question, By what Board of Directors was the decision first made to rely on locomotive power? That decision was made by the Directors of the South Carolina Railroad, in the city of Charleston. It is of interest to give attention to the precise time when that decision was placed on record, and to the unsettled state of the question at that time, some of the important facts not being generally known. It was on my report that the decision was made, and the facts, as known to me, were as follows: On this side of the Atlantic the Baltimore and Ohio road had in use sixteen miles of road, and were advised by friends of the road in England to rely on horse power. On the other side of the water the judgment of George Stephenson had not been sufficient to decide the question for the Liverpool and Manchester Railroad, and the general question was referred to two of the eminent engineers of the time, James Walker, of London, and John U. Rastrick, of Stourbridge; and in reply the two concurred in the recommendation that the transportation should be effected by a series of stationary engines and long ropes. As a further source of information on this unsettled question, a reward was offered by the Liverpool and Manchester Railroad of 500 pounds sterling for a locomotive engine that would haul three times its own weight at ten miles an hour. At that time and before the trial of the locomotive called into existence by a premium had been made, my report was prepared, submitted, and acted on. In that report the estimates that presented favorably locomotive power were based on facts collected by myself on the line of the Stockton and Darlington Railroad. But the decisive recommendation to adopt the locomotive as the power to be used on the South Carolina Railroad was on the broad ground that, while there was no reason to anticipate that the breed of horses could be materially improved, the man was not living who could say what the breed of locomotives would be. Within half an hour, at a full meeting of the Directors, the President in his chair, the vote was unanimous in favor of the locomotive. Of those then present a few, myself of the number, are yet in the land, and for myself I have to say that the end is not yet nor will it be when I am no longer here to see. / In brief summary, it may be said that, starting with what was open to the eyes of all, on the Stockton and Darlington Railroad in 1828, this country has very fully done its part in the wonderful development since that date. HORATIO ALLEN. / Homewood, South Orange, N. J., February 12, 1883." *(Carbondale Advance,* February 24, 1883, p. 3)

The erroneous data identified by Horatio Allen in the New York newspaper article above may well have been the stimulus for Allen to publish in 1884 his booklet entitled "The Railroad Era. The First Five Years of Its Development"

31. 1886

Mathews, in a footnote on pp. 239-40, cites an article from the *Morning Courier and New York Enquirer* wherein is described the exhibition and demonstration of the *Stourbridge Lion* on May 28, 1829 at the works of William Kemble in New York. Here is that account:

"We yesterday attended the first exhibition of a locomotive engine called 'The Lion,' imported by the Delaware and Hudson Canal Company, to be used upon their railway. On Wednesday the engine just imported was placed upon exhibition, and was unanimously attended by gentlemen of science and particular intelligence. The steam was raised by the Lackawaxen (Lackawanna) coal, and sustained (although there was no friction) at between forty and fifty pounds to the inch. Pleased as we were, however, with the engine, we were much more pleased with the practical demonstration offered of the importance and usefulness of the coal which the company propose to bring to market. It is now reduced to a certainty that the Lackawaxen (Lackawanna) coal will generate steam in sufficient quantity to answer all the purposes to which it is applied, and this fact is not only of great importance to the company, but it is worth millions to our State."

32. June 18, 1889:

Lindsay and Early deposited the *Stourbridge Lion's* boiler in the Smithsonian. A number of other parts of the *Lion* were also deposited there.

Here are two space ads that Lindsay & Early placed in the *Carbondale Leader* in 1888 and 1891:

December 6, 1888, p. 2

August 25, 1891, p 4
August 26, 1891, p. 1

33. 1890:

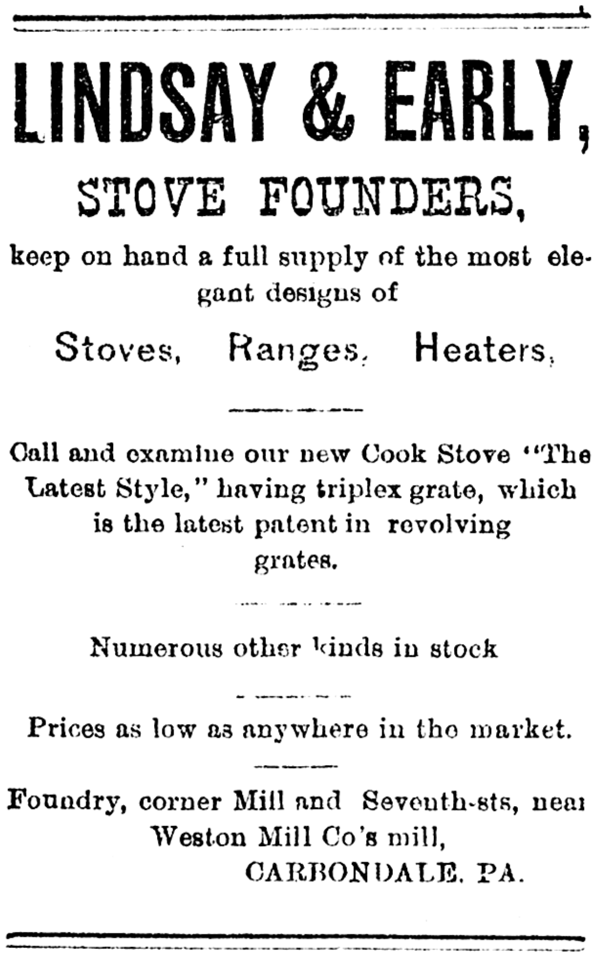
January 1, 1890: death of Horatio Allen; obituary of Horatio Allen:

"HORATIO ALLEN. / Horatio Allen, who took a most prominent part in the development of steam as a motive power in the early years of this century, and who ran the first locomotive ever propelled over a track in this country, died yesterday morning at his residence, 'Homewood,' near South Orange, N.J. He was eighty-eight years old. He was born in Schenectady. His father was Dr. Allen, the head of a large school at Hyde Park, on the Hudson. / Mr. Allen was graduated from Columbia College about 1820, taking high honors in mathematics. He at once turned his attention to civil engineering, and a few years later entered the service of <u>the Delaware and Hudson Canal Company, the great engineering enterprise of the time.</u> [emphasis added]. In January, 1828, <u>he went to England and purchased three locomotives for that corporation</u>. [emphasis added, for reasons which will be made clear in the volume in this series on the Stourbridge Lion]. Two of them were built by George Stephenson at Newcastle and one by Foster, Rastrick & Co. at Stourbridge. They arrived in New-York in the Winter of 1828-9 and were at once set up, but, the river and canal being closed by ice, it was not until the opening of navigation in the Spring of 1829 that access was had to the railroad which had been laid for the experimental trip at Honesdale, Penn. / The line ran from the town to a point about three miles away, terminating in the woods. The road was formed by rails of hemlock timber in sections, 6 by 12 inches, supported by caps of timber 10 feet from centre to centre. On the surface of the rail of wood was spiked the railroad iron—a bar of roll iron 2 ¼ inches wide and half an inch thick. Fears were expressed by the crowd that had gathered to see the trial that the road would either break down under the weight of the locomotive or that, when the one curve was reached, the locomotive would not keep the track. The engine was called the 'Stourbridge Lion." . . . / In September, 1829, Mr. Allen went to Charleston, S. C., as the chief engineer of the South Carolina Railroad, and it was on his recommendation that locomotives were there substituted for horse power. Mr. Allen stating in his report to the Directors on the subject that there was 'no reason to expect any material improvement in the breed of horses, while, in my judgment, the man is not living who knows what the breed of locomotives will place at command.' / Mr. Allen remained in Charleston for some years. He married, in 1834, the daughter of the Rev. James Dewar Simons. Returning to New-York he became the President of the Novelty Iron Works, which built many of the steamers of the Collins and Pacific Mail Lines. He also took part in the erection of High Bridge and the reservoir at Forty-second street, and his name is inscribed on both structures. The 'Allen paper wheel,' which is used a great deal in this country, especially under sleeping cars, was his invention. / Mr. Allen retained a lively interest in railroad and other engineering matters up to the time of his death. He leaves a widow, one son, and three daughters." (*The New York Times*, January 2, 1890)

Article from the *Carbondale Leader,* May 20, 1890, p. 3, about the boiler of the *Stourbridge Lion:*

“THE STOURBRIDGE LION BOILER. / Not Likely to Remain a Carbondale Possession Much Longer. / The famous boiler of ‘The Stourbridge Lion,’ the first locomotive ever run in America, which is owned by Lindsay & Early, the founders, is now in Scranton, where Mr. Early has it on exhibition. It is not likely to remain a Carbondale possession. If it does not prove to be a paying venture as an exhibition, which is exceedingly doubtful, it will probably be sold, several offers having been received for it. The boiler is actually worth only what the old iron in it would bring in the market, but its historical association make it more valuable for preservation, and in this respect its value will increase yearly. T. F. Leonard, of Scranton, several years ago offered Lindsay & Early $300 for it, and he recently said that he was still ready to give that sum for it. It is presumed that Mr. Leonard wants it for speculative purposes and believes he can realize a profit on his investment of $300 by reselling it at a higher figure. / Several other inquiries for a price have been received, among them one from the Smithsonian Institution at Washington, the managers of which say they are not prepared to make an offer, but that should the owners decide to sell, they would like a refusal. They intimate that they can not expend a large sum for the purchase, as their expenditures are confined to the appropriations made annually by Congress to the Institution. / Lindsay & Early, however, believe that the proper place for the historical boiler is in the possession of the government and it is likely to go to Washington if the Smithsonian is willing to meet the offers of others.” *(Carbondale Leader,* May 20, 1890, p. 3)

Lindsay & Early owned the boiler of the *Stourbridge Lion* in 1890. Here is a space ad that they placed in the *Carbondale Leader,* August 5, 1890, p. 1:



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keep on hand a full supply of the most elegant designs of

Stoves, Ranges, Heaters,

Call and examine our new Cook Stove "The Latest Style," having triplex grate, which is the latest patent in revolving grates.

Numerous other kinds in stock

Prices as low as anywhere in the market.

Foundry, corner Mill and Seventh-sts, near Weston Mill Co's mill, CARBONDALE, PA.

Here is a portrait of Lindsay & Early that was published in the *Carbondale Advance,* November 11, 1882, p. 3:

'ETCHINGS.' / By which the 'Advance' attempts a fair portrayal of / THE CITY OF CARBONDALE. / No. V. / LINDSAY & EARLY / One of the most prosperous manufacturing enterprises in the city is the stove foundry of the above-named firm, and, knowing this to be the case, an *Advance* reporter recently visited it in order to gain some items for publication in this review. / The Carbondale Stove Works have been in existence for a long time, having been originally established as long ago as 1830 (if we are not mistaken in the date) by John Simpson, who conducted the business for some years. Then the shops were closed for a time and finally were reopened in 1856 by John Stuart. In 1869 Messrs Lindsay & Early succeeded to the

proprietorship, and their partnership continued uninterrupted until the death of Mr. Lindsay in 1879. His widow still retains the interest in the business, so the firm style has remained unchanged, tho' the active management of affairs falls upon Mr. Early. The last-named gentleman is a man of about middle age. He, like many of the citizens of Carbondale, is a native of Ireland, but this city has been his home ever since he was a boy eight years of age. He is a practical stove founder, having begun his apprenticeship to the trade with Mr. Stuart when the latter gentleman resuscitated the works in 1856. From that time to this, a period of twenty-six years, he has, as apprentice, journeyman and proprietor, remained identified with the works. / The foundry is at the corner of 7th and Mill Streets, and though the buildings themselves call for no special mention, within them is carried on a business of greater magnitude than our readers are generally aware of. The average production of stoves (heating and cooking) is nine per week, or a total of nearly 500 per year. The number of cooking stoves preponderates, and the shops are turning out a class of goods that have no superior. The works don't make the loud sounding pretentions that many others do, but all the same they continue to gain patrons and friends, and the highest compliment that can be paid the factory is to say that the stoves are in best repute here at home where they are best known. / The cooking and heating stoves made by Lindsay & Early are each known by the name of the 'People's Choice.' The patterns for the cooking stoves were got out in 1877, and since then nearly 1500 have been made and sold. The 'People's Choice' heating stove was first made in 1881. / In especially noticing these articles we could not but observe their appearance, their adaptation and their finish. The castings are remarkably smooth, the ornamentation is in the best of good taste, and yet nothing is sacrificed in appearances. Only the best of material is used, competent workmen are employed in their construction, and throughout this and adjacent counties the stoves are held in the highest esteem. The cooking stove has a very large oven and an especially large fire-box, just suited to a section of the country where coal is cheap, and will burn pea or chestnut. By an ingenious arrangement this fire-box can be made as much smaller as may be desired. In brief it is just such a stove as meets the wants of the trade, and the demand shows that it is indeed the 'people's choice.' / Mr. Early informs us that the demand this season from both dealers and those buying for their own use has been very good. Prices are the same as they were last year, and every indication points to a good fall trade. It is certainly the wish of the *Advance* that every expectation of the firm may be realized, and we hope to see such a 'boom' set in as will call for material enlargement of the works.*"(Carbondale Advance*, November 11, 1882, p. 3)

34. April 21, 1893:

Article from the *Carbondale Leader,* April 21, 1893, about the *Stourbridge Lion:*

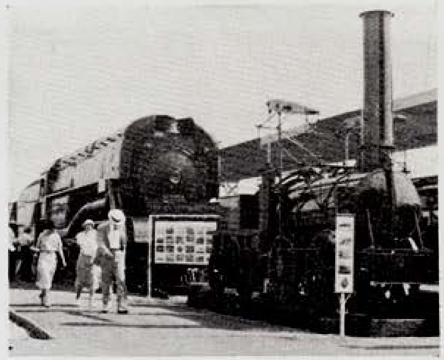
"THE FIRST LOCOMOTIVE. / DISCUSSION OF WHAT IT WAS AND WHERE IT RAN. / C. V. R. Ludington Describes the 'Stourbridge Lion' and its First Trip at Honesdale. / Noting the departure of the original John Bull locomotive engine for Chicago, C. V. R. Ludington, of Montreal, calls the N. Y. Tribune to account for stating that it is the first

locomotive used upon a railroad for passengers or freight in this country. Nor, he says, is the time when, nor the place where, nor the road on which the first locomotive was used in this country correctly stated. It is noteworthy that after the lapse of only sixty-four years this coming summer so much confusion and error should exist upon so important a subject. Too much interest cannot be given to or felt in properly fixing the place where was first laid the iron rail over which was turned the first wheel of a locomotive in this hemisphere. It was not in New York, Philadelphia, Boston, Charleston or Baltimore, or any great city, or any great river or seaboard town, where commercial thought and enterprise dominate; but it was in the little borough of Honesdale, in the country of Wayne, Pennsylvania, 135 miles west from the city of New York. It was not the John Bull, the Sannpure, or the Alran or the Best Friend, but it was the Stourbridge Lion that made the first run—the pioneer in that vast system or railroad transportation that now covers more than 200,000 miles in America. It is time that due credit and justice should be accorded where it rightfully belongs. / Horatio Allen, a famous civil engineer, after completing his surveys and work for the Delaware and Hudson Canal company on the line over which the first locomotive as to pass, resigned his position and made a visit to England and Wales in 1827 for the purpose of examining the much-talked-of system of using steam as a motive poser in hauling coal from the mines. He had heard of the success of George Stephenson with locomotives. While on this visit he had some correspondence with John B. Jervis, the chief engineer of the Delaware & Hudson Canal company, who learning of his purpose commissioned him to purchase the iron in England for the railroad between Honesdale and Carbondale, and the chains to be used for their inclined planes, and also to purchase three locomotives to be run on their rails. / Mr. Allen devised the plan or form of the rail. The ironmasters, except one or two, pronounced them impracticable. He finally ordered them made at Merthyr Tydvil in South Wales, but they were so badly made that he refused to take them. He then went to Wolverhampton, England, and contracted for their manufacture. Here for the first his plan was approved. The rails were manufactured, shipped, laid and formed the first railroad track of the company intended only for steam power. / While in England, the Liverpool and Manchester railway was being constructed, the point was disputed whether it should be operated by stationary power or locomotive engines. The prevailing opinion among engineers seemed to favor stationary power. While the subject was being debated Mr. Allen ordered three locomotives built, one for the Delaware & Hudson Canal Company's road. They were built under his supervision, he suggesting many improvements upon those he had seen; one was the removal of the firebox from the boiler and locating it underneath. In the fall of 1828 Mr. Allen returned to America. In the spring of 1829 one of the locomotives built by George Stephenson at Newcastle-on-Tyne was received and put on their road between Honesdale and Carbondale in the summer of 1829. This was the first locomotive ever run in America. The handling of such a strange machine was of such doubtful safety that Mr. Allen was obliged to dispel all fears on the subject by man and running it in person as far as Seelyville, where he reversed the engine and returned in safety to Honesdale. This was on August 9 [should read August 8], 1829. The whole country for miles around assembled to witness the beginning of the greatest triumph in human progress and material development the world had ever beheld."

35. World’s Columbian Exposition, Chicago, 1893:

A replica of the *Stourbridge Lion* was shown at World’s Columbian Exposition in Chicago in 1893. That we know from the article “Exhibits at “A Century of Progress” Exposition” that was published in the *Delaware and Hudson Company Bulletin*, August 1, 1933, pp. 117-118, as follows:

"The D&H" Exhibits at "A Century of Progress" Exposition



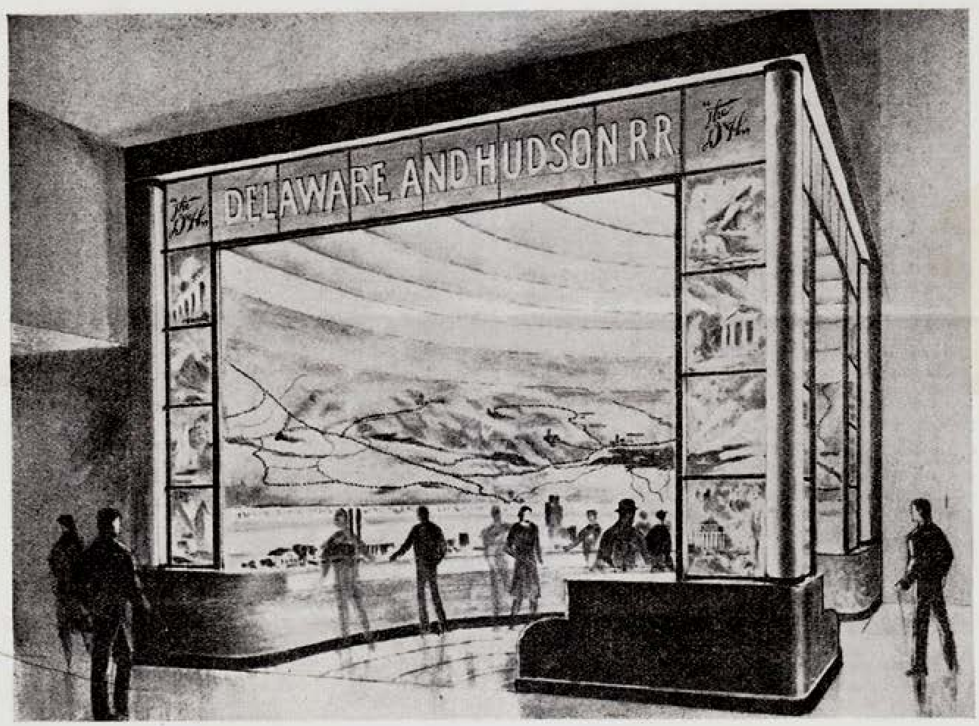
Our locomotives on display

HOW the Delaware and Hudson's *Stourbridge Lion*, first locomotive to be run on an American railroad, August 8th, 1829, came to go to the "Century of Progress" Exposition at Chicago in 1933 was told in the May issue of *The Bulletin* in an article describing the construction at Colonie Locomotive Shops of a replica of the original machine. In the same issue there was a description of the *L. F. Loree*, Delaware and Hudson Locomotive No. 1403, which also went to the exposition with the *Lion*, thus completing, as far as steam locomotive construction is concerned, not only a century of progress but, in effect, its entire history on this continent.

That the *Stourbridge Lion* had previously visited Chicago is, perhaps, news to many *Bulletin* readers, but the fact remains that, in 1893, the *Lion*, in replica, journeyed to the World's Columbian Exposition as shown in the accompanying illustration.

Stourbridge Lion shown at World's Columbian Exposition in Chicago in 1893

In addition to the locomotive exhibits, the Company also has an indoor booth, an artist's conception of which is also shown. Centering about the column in the foreground a mural painting, curving



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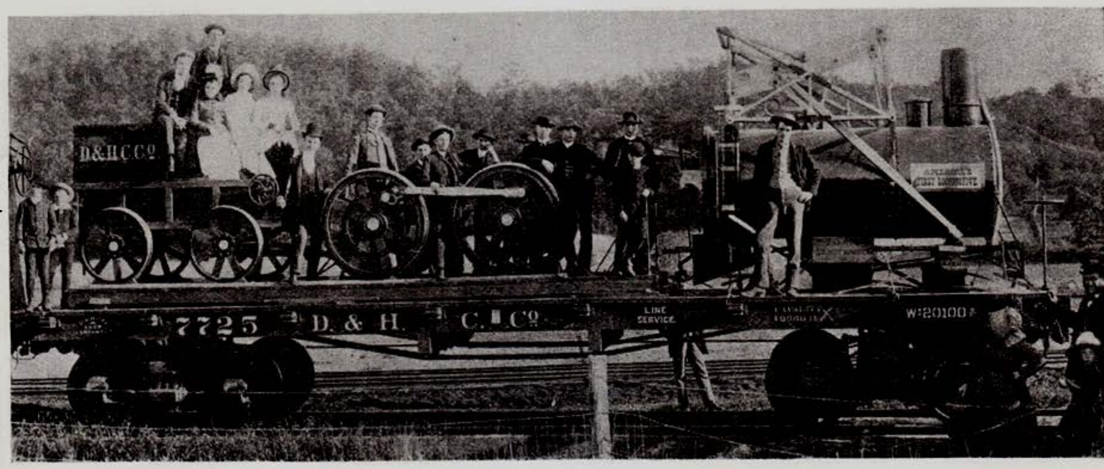
through a quarter-circle, portrays a panoramic view of the Delaware and Hudson territory from Wilkes-Barre and Binghamton to Montreal. It shows the location of the various cities, lakes, mountains and other points of interest along the lines.

Below and in front of the painting is a group of relief maps, modelled exactly to scale by members of the Engineering Department, and showing (1) the Marvine Breaker, Scranton, Pa., where Delaware and Hudson anthracite is prepared for market, (2) the Port of Albany, including the largest single-unit grain elevator in the world, (3) the Hotel Champlain and cottages at Bluff Point, N. Y., and (4) the plant of the Chateaugay Ore and Iron Company at Lyon Mountain, N. Y.

A series of photographic transparencies depicting scenes at various points in the Adirondacks, on Lakes George and Champlain, in Ausable Chasm and the Hudson and Susquehanna Valleys is used between the relief maps and the corner posts of the booth.

Glass cases containing specimens of the various products of the Company's subsidiaries and of the region traversed by the railroad are placed in front of and below the relief maps. The marble floor and counters, the color scheme of gunmetal, chromium and black, and a generous use of electric lights, all of which are concealed from view, produces a most pleasing effect.

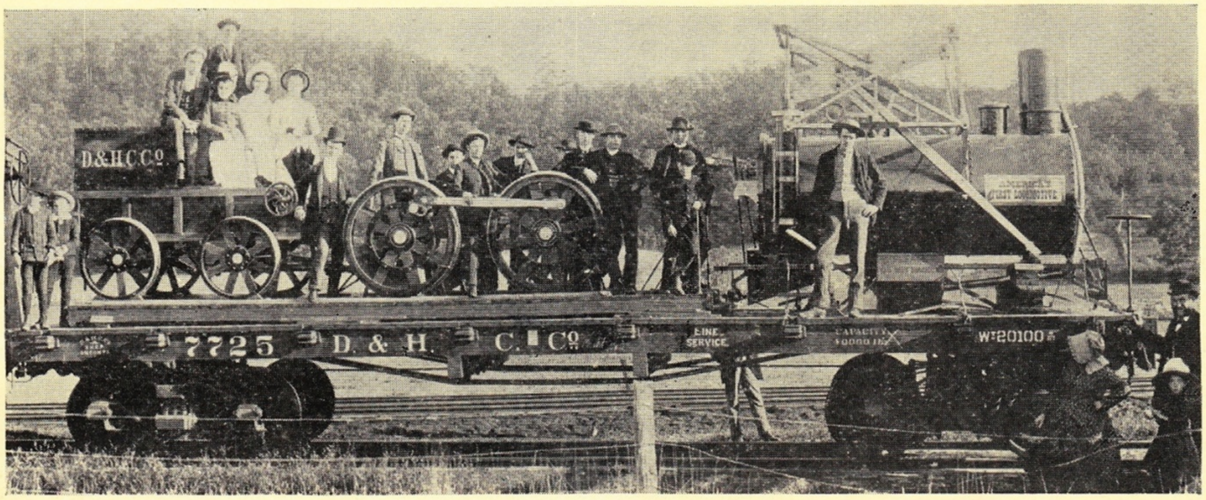
One can not help but wonder what became of this replica of the *Stourbridge Lion?*



"Stourbridge Lion" Chicago-bound in 1893

Here is a good quality photograph of the *Stourbridge Lion* on its way to Chicago, in 1893, at Nescopeck, PA, in the Pennsylvania Railroad yards there:

A photograph of the *Stourbridge Lion* en route to the Columbian Exposition in Chicago in 1893 on a D&H flat car is the frontispiece of *Passenger, Freight and Work Equipment on the Delaware and Hudson The Delaware and Hudson Company BOARD OF MANAGERS INSPECTION OF LINES : :* June 2, June 5, 1927. Here is that photograph:



1890-1900

An interesting photograph of the "Stourbridge Lion," weight about 7,000 pounds, en route to the Columbian Exposition in Chicago, (1893), on a 40,000 pounds capacity D. & H. C. Co. flat car. This photograph was taken in the Pennsylvania Railroad yards at Nescopeck, Pa.

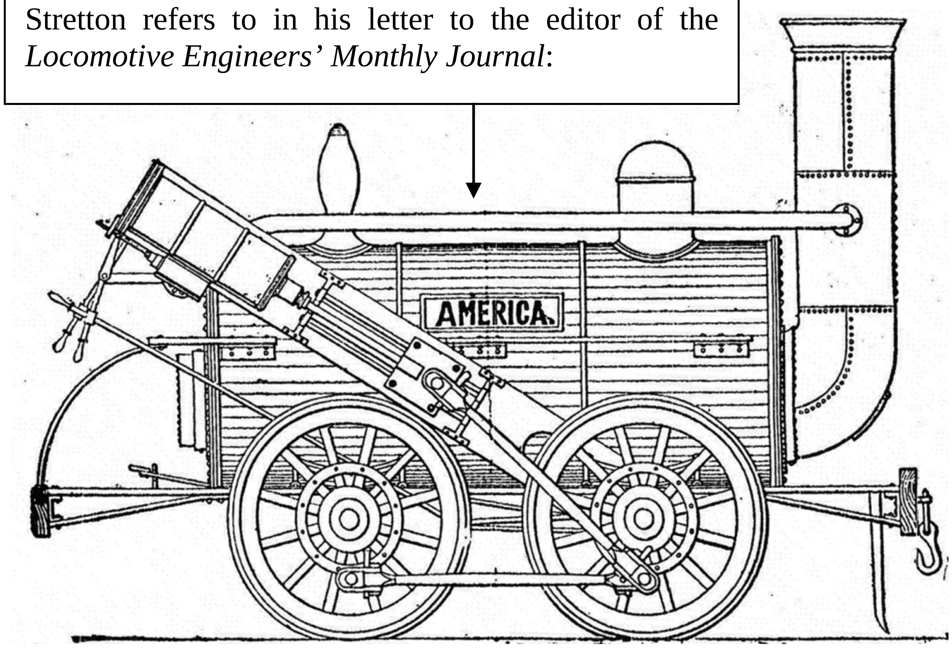
36. November 13, 1896:

Letter, dated November 13, 1896, about the *Stourbridge Lion,* from Clement E. Stretton to the editor of the *Locomotive Engineers' Monthly Journal;* comment from the editor about Stretton's letter::

"Horatio Allen. / Leicester, England, Nov. 13, 1896. / Editor Journal—Sir: In your issue for November, p. 972, some interesting details are given relating to the work of Mr. Allen, but I am sorry to observe some serious errors, especially as to locomotives ordered in England. The facts are, that early in the year 1828, the Delaware and Hudson Canal Company, having heard of the success of the Stockton and Darlington Railway, sent Mr. Horatio Allen over to England and with instructions to obtain information and purchase rails and four locomotives. He gave an order to Mr. Stephenson for one engine, to be named 'America' (diagram annexed), and to Foster and Rastrick for three engines, to be named 'Stourbridge Lion,' 'Delaware' and 'Hudson.' / Stephenson's engine was built in 1828, and arrived in New York, on board the ship 'Columbia,' about the middle of January, 1829. The 'Stourbridge Lion' did not arrive in New York till May,

1829. I have the original working drawing of all these engines. They were shown at the Chicago Exhibition in 1893, and the facts are well known to the Delaware and Hudson Canal Company. [signed] CLEMENT E. STRETTON, C. E." / Mr. Stretton is widely known and authority, particularly on history of the locomotive, and we are glad to have our attention called to this discrepancy. The article alluded to was written by Mr. Alfred Mathews, for *Cassier's Magazin*e, published in London and New York, and we deemed it such authority that we did not question any statement. Our attention having been called to the matter by the above letter, we find by reference to the best American authority that the disagreement between Mr. Stretton and Mr. Mathews' statement is that Mr. Stephenson built two, and Foster and Rastrick three, and we do not question Mr. Stretton's positive knowledge of the facts. We further find conclusive evidence that Mr. Stephenson's engine was first to arrive, and are lead to believe Mr. Mathews' failure to state that fact had no purpose in it but was an oversight, which may be explained by the following found in our standard authorities: / In the spring of 1829, one of these engines was ordered to be sent by river and canal to Honesdale, Pa. The accident which sent the 'Stourbridge Lion' rather than either of the other two has not been accounted for. (Johnson's Cyclopedia.) / Several other authorities seem to agree on this statement. . ." *(Locomotive Engineers' Monthly Journal*, Railroad News Gleanings, copy of article in the archives of the Wayne County Historical Society).

This is the diagram of the *America* that Clement E. Stretton refers to in his letter to the editor of the *Locomotive Engineers' Monthly Journal*:



37. 1903:

Material from Edward A. Penniman's 1903 publication about Horatio Allen and the *Stourbridge Lion:*

THE

STOURBRIDGE LION

A compilation of authorities proving the claim made for
the Stourbridge Lion as having been

THE FIRST LOCOMOTIVE

to turn a wheel on

THE WESTERN HEMISPHERE

Together with a brief Biographical Sketch of

HORATIO ALLEN

THE FIRST LOCOMOTIVE ENGINEER IN AMERICA

BY

EDWARD A. PENNIMAN

CITIZEN PRINT
HONESDALE, PA.
1903

"…In 1825 he [Horatio Allen] was appointed Resident Engineer of the Summit Level of the Delaware & Hudson canal, then in course of construction, and later had charge of the section between the Summit level and the Delaware river. . . .John B. Jervis, the Chief Engineer of the Del. & Hud. Canal Co. . . .brought about an arrangement whereby he [Allen] was commissioned by that corporation [the D&H] to purchase in England the bar iron rails to be used on the road between Honesdale and Carbondale, the chains required on the inclined planes, and three locomotives to run on the levels [emphasis added]. It was stipulated in the agreement between the company and Mr. Allen that his traveling and other expenses on sea and land were to be paid

by the former, but that they were not to exceed $900. His time for the trip was limited to three months, but so much difficulty was experienced in the manufacture of the iron to meet his views, his leave of absence was extended to nearly a year. He went out in the autumn of 1827, when barely twenty-five years of age, and retuned in the fall of 1828. The locomotives soon followed him, the other railway supplies having been forwarded earlier. . .”

Penniman (p. 9) says the following about the *Stourbridge Lion* in the period following the trial runs:

> The engine remained under a shed, near where its trial was made, for more than twenty years, and was then removed to the Honesdale foundry, on Ladywood Lane, where it was partially dismantled and broken up. One of the cylinders and the connecting rods of both cylinders and pumps eventually fell into the hands of George B. Smith, of Dunmore, Pa. The other cylinder is in the possession of the heirs of Steuben Jenkins, of Wyoming, Luzerne county, Pa. Such parts as the Government, some years since, was enabled to gather up, were taken to Washington, D. C., where the missing portions were supplied, and the locomotive, as reconstructed, is now on exhibition at the Smithsonian Institution.

Penniman gives two historical references from 1902 which say that Allen bought three engines. Here are those two references (from *Penniman,* pp. 12-13):

> “The Four Track News,” an illustrated magazine of travel and education, published by George H. Daniels, General Passenger Agent of the New York Central and Hudson River Railroad, for November, 1902, contained an article on “Early Rapid Transit in America,” by N. H. Moore, from which we take the following:
>
> “In 1829, three locomotives were imported from England to America, and one was tried at Honesdale, Pa., [August 8th, 1829,] upon the tracks of the Delaware and Hudson.”

> The Encyclopædia Britannica, Vol. XX, page 253, says:
>
> “Railway development in the United States has had to adapt itself to the needs of a new and rapidly growing country, a large part of which was first made available for settlement by railways. Three locomotives were imported from England in 1828, and the first trial in America took place on August 8, 1829, at Honesdale, Pennsylvania.”

38: 1904:

Undated newspaper clipping (from 1904 newspaper), in one of the Gritman scrapbooks in the archives of the Carbondale Historical Society, titled "Seventy-Fifth Anniversary of the First Locomotive to Turn a Wheel in America." Therein, we read that Horatio Allen, during his trip to England was charged by the D&H "to purchase bar iron rails to be used on the road between Honesdale and Carbondale, the chains required on the inclined planes and three locomotives to run on the levels. . . "

39. July 24, 1912:

Here is an article, titled "Magazine Tells of Old Locomotive," about the *Stourbridge Lion,* that was published on page one of a Wayne County newspaper on July 24, 1912:

"Magazine Tells of Old Locomotive. / ***Railroad Man's*** **for August has a Long Account of First Engine to Run in America. /** In the *Railroad Man's* magazine for August appears an article [about the *Stourbridge Lion]* that will be of interest to everyone in Honesdale. . . /. . . Mr. Allen, while in England, purchased for the Delaware and Hudson Canal and Railroad Company three locomotives. The famous 'Stourbridge Lion' was one of these, and the first to arrive in New York. Its performance in the yard of the works where it was landed—the West Point Foundry at the foot of Beach street, New York City—were witnessed by thousands of people. / David Mathew, who had charge of the men in the shops of the West point Foundry, and who had been the eagle-eye of the De Witt Clinton, wrote as follows about the new locomotive: / Some time about the middle of May, 1829, the locomotive called the 'Stourbridge Lion' arrived from England, on the ship John Jay. It was landed at the wharf of the West Point Foundry Works, foot of Beach street, New York City. The engine was in charge of Horatio Allen, assistant engineer of the Delaware and Hudson Canal and Railroad Company. The locomotive was blocked up in our yard, and steam put to it from our works, and it became the object of curiosity to thousands who visited the works from day to day, to see the curious 'critter' go through the motions only, as there was no road for it about the premises. After a short stay in New York, about the 1st of July, it was shipped up the North River to Rondout, for the Delaware and Hudson Canal Company, and then by canal to Carbondale, where it was tried upon their railroad at Honesdale, run a few miles out upon the road, then taken off the track, the road not being sufficiently strong to carry it. It was housed and held for sale for many years./ John B. Jervis, inventor of the locomotive-truck*, who was, in 1829, chief engineer of the Delaware and Hudson Canal Company, later wrote about the arrival of the first locomotive in America. / The name of the first locomotive ordered from England and the first in America, was the 'Stourbridge Lion,' and to your question when and where it was landed, I will refer you to the following letters addressed to me at the time, by Horatio Allen, who was in New York City waiting its arrival, and had contracted for it when in England. On referring to my papers, I find that the engine arrived at Rondout on the way to Honesdale from New York, on the 4th of July, 1829. My recollections are that it was put in

motion on the Carbondale Railroad at Honesdale, in August, same year, most probably the early part of August. <u>The locomotive and two or three others were obtained from England for the said road</u> [emphasis added], but only the 'Lion' was set up. / It worked very well, and no doubt would have done good service if the trestle work (of which there was a large portion on the road) had been sufficient to sustain the weight of the engine in working. It was the intention of having engines of one and a quarter ton on a wheel at the heaviest; but the builders of the engine or that time had little experience, and when the machine was constructed it was found to have nearly two tons on a wheel and this the road was not designed for. Subsequently the road has been made a gravity railroad, all the power in both directions being stationary; which is no doubt the best economy for the circumstances and nature of the traffic. . . "

* Jervis' invention consisted of four wheels, pivoted at their center, which carried the front end of the locomotive, and because of the ability to pivot, increased the engine's capacity for rounding curves. By 1835, four years after Jervis had perfected it, it became universal in use.

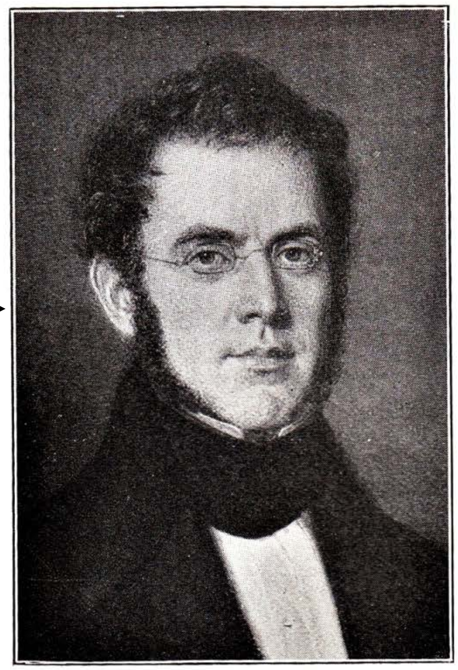
40. 1923:

Here is the material about Horatio Allen's Trip to England and the *Stourbridge Lion* that is given in ***Century of Progress*** (1923), pp. 47-61:

1814-1829

Railroads were then very new in America and elsewhere. President Bolton, in his report of 1827, says:

Horatio Allen, age 25, was entrusted by John Jervis/the D&H to make certain purchases for the D&H during his trip to England in 1828.



Horatio Allen, in early life, from miniature on ivory by D'Aubigny, Paris, 1835.

In 1883, Horatio Allen said that he was not "sent to England" by the D&H. Rather, he decided to go there at his own expense. While there, the D&H asked him to make certain purchases for them.

"Only one, a few miles in length, near Boston, had been tested by a winter's cold." There was but one rolling mill near New York and the Managers decided to send Horatio Allen to England for railroad iron. During the construction of the canal Mr. Allen had been one of the resident engineers under Mr. Jervis and they entertained for each other feelings of respect and friendly esteem. Under date of January 16, 1828, Mr. Jervis formulated a letter of in-

47

During the construction of the D&H Canal, Allen worked as a resident engineer under John Jervis "and they entertained for each other feelings of respect and friendly esteem."

During his time in England, Allen was asked by the D&H not only to purchase strap rail for the D&H but also "to have built there four locomotives [for the D&H] that were to be manufactured in accordance with the general instructions which this letter [John Jervis to Allen, January 16, 1828] contained."

Jervis' letter to Allen contained exact specifications for the engines "although leaving certain points of considerable importance to Mr. Allen's discretion."

Horatio Allen sailed from New York for England on January 24, 1828, and reached Liverpool on February 15.

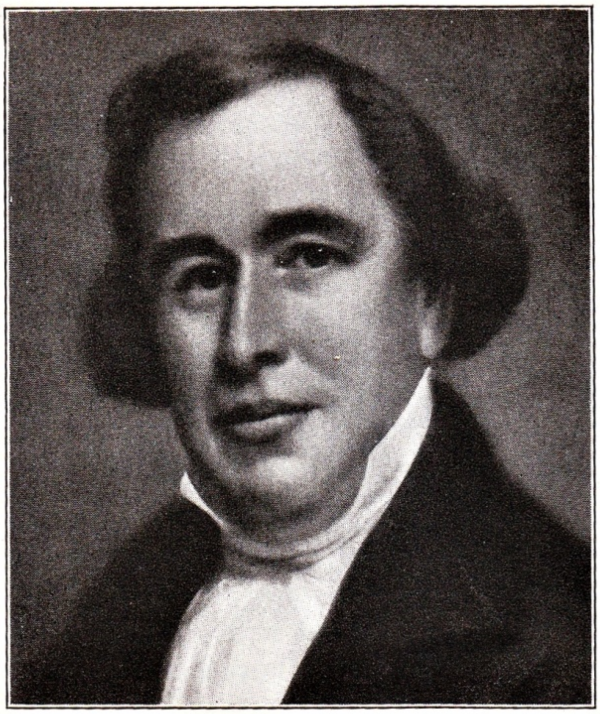
structions to govern Mr. Allen on his foreign mission. This mission was twofold, for he went to England not only to purchase the necessary railroad iron, but to have built there four locomotives that were to be manufactured in accordance with the general instructions which this letter contained. Very minutely the letter specifies the dimensions of the rail plates and many of the details of their construction. With almost equal minuteness it deals with the specifications for the locomotives, although leaving certain points of considerable importance to Mr. Allen's discretion. The contemplated speed of these engines was low, about four miles per hour. Whether the locomotives should have four or six wheels was left to Mr. Allen; but the gauge was provided for definitely as four feet three inches. If Mr. Allen discovered unexpected difficulties in respect of the use of steam locomotives, he was instructed not to "make an engagement" but to communicate the result of his observations as early as possible. It was not contemplated that Mr. Allen should purchase or contract for railroad cars, but the letter, in its closing paragraph, instructed him to make inquiries in regard to every detail of their construction and adaptability for convenient commercial use in carrying coal.

Mr. Allen left New York on January 24, 1828, and reached Liverpool on February 15. Six days after landing he met George Stephenson, with whom he immediately established most agreeable relations; receiving from him while in England every kindness and all the aid that he could render.

At this time not a single railroad steam locomotive had ever turned a wheel or run on any track in the United States, and even in England their superiority to the horse was not yet generally recognized. Horatio Allen was not yet twenty-six years of age when entrusted with this important mission to a foreign country, with none of the modern advantages of ready communication with those to whom he was responsible. His later career fully sustained the prom-

Allen worked for the D&H until September, 1829. He then worked for the South Carolina railroad, the Croton Aqueduct, the New York and Erie Railroad (of which he was elected president in 1843), and served as consulting engineer on the East River, Brooklyn, Suspension Bridge.

ise of his early life and confirms the wisdom of Mr. Jervis in designating him for this task. After leaving the company in September, 1829, the South Carolina railroad, the Croton aqueduct and the New York and Erie railroad employed his services; and in 1843 he became president of the last named company. In 1870, when nearing seventy years of age, Mr. Allen was consulting engineer of the East river, Brooklyn, Suspension Bridge.



John Hunter, an original Manager, 1825–1826.

His first English contract was made with the firm of R. & A. Hill of Cardiff and Merthyr Tydvil to furnish railroad iron but upon inspection he found it unsatisfactory. He then ordered it of Messrs. W. & I. Sparrow of Wolverhampton, and it was being made within ten days and on delivery met with approval. He afterwards stated that the very large amount of iron for similar use subsequently

Allen ordered railroad iron (strap rail) from Messrs. W. & I. Sparrow of Wolverhampton, "and it was being made within ten days and on delivery met with approval."

"... in a letter dated July 19, 1828, he [Allen] advised the Managers of the company that he had closed with Robert Stephenson and Company of Newcastle for one locomotive and with Foster, Rastrick and Company of Stourbridge for three."

made for delivery in the United States was all produced according to the plan that he then approved.

The exact date when Mr. Allen contracted for locomotives is not known, but in a letter dated July 19, 1828, he advised the Managers of the company that he had closed with Robert Stephenson and Company of Newcastle for one locomotive and with Foster, Rastrick and Company of Stourbridge for three. Late in June he had been authorized to engage, in England, two competent men to superintend the running of the locomotives, but there is no record that any such engagement was made. To place orders for locomotives upon specifications satisfactory to himself required devoting much time to the consideration of plans, particularly those of the boilers. In studying this subject, he visited Liverpool to observe the progress of the Liverpool and Manchester railroad, and Newcastle with a like purpose in regard to the Stockton and Darlington. His observations during these inspections were made with his usual care.

The names of the four locomotives

"... evidence that is to some extent conflicting. . . ."

Although there has been uncertainty concerning the names of three of the four locomotives which Mr. Allen purchased during this trip to England, the name of one is thoroughly established; and this locomotive, the *Stourbridge Lion,* built by Foster, Rastrick and Company has acquired an unique place in transportation history. Upon evidence that is to some extent conflicting the names attributed to the other locomotives have been, respectively, the *America,* the *Delaware,* and the *Hudson.* Clement E. Stretton, author of "Development of the Locomotive," gives the name of the Stephenson locomotive as *America,* and in a letter, dated November 13, 1896, to the *Brotherhood of Locomotive Engineers' Journal,* states that the names of the other two locomotives were the *Delaware* and the *Hudson.* This letter appeared in the January, 1897, issue of that journal. In the history of Robert Stephenson and Company, by J. G. H. Warren, entitled "A Century of Locomotive Building," published in England in 1923,

"... Mr. Stretton's statements, however, are to some extent contradicted by Mr. James S. McEntee, an early engineer in the company's service. .

the name *America* appears as a subhead opposite the text dealing with the manufacture of the Stephenson locomotive which Allen ordered, although the text does not specifically name this locomotive. Mr. Stretton's statements, however, are to some extent contradicted by Mr. James S. McEntee, an early engineer in the company's service, who, forty-five years later in 1874, dictated his recollections of the construction and early operation of the canal. In these reminiscences Mr. McEntee in referring to the four locomotives says that two, which he does not name, were put on a canal boat and taken to Honesdale, and that two of them, "the *Fox* and the *Lion*, never got any farther than Rondout, where they were stored in a temporary shed on the upper dock until the woodwork nearly rotted away, the

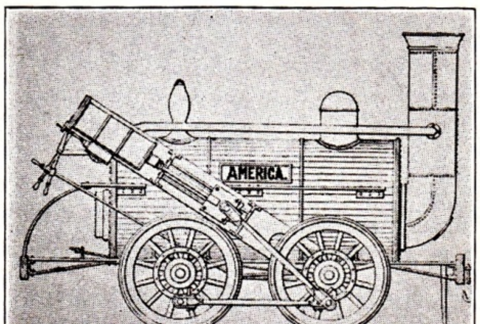


Fig. 14.—The First Locomotive for America, 1828.

Locomotive *America*.

boilers having been taken for other uses. They were finally removed to the White storehouse near the present Clinton Hall, and were burned up in a fire which destroyed the building." Mr. McEntee's plain error as to the *Lion* makes it possible that he has also erred in his recollection of the name of the other. His statement that two of the locomotives were stored at Rondout is, in regard to one of them, confirmed by a letter of President Bolton, dated September 22, 1829, to Samuel Flewelling, the company's treasurer, in New York City. In this letter and referring to a locomotive which had arrived at Rondout earlier in

"Mr. McEntee's plain error as to the *Lion* makes it possible that he has also erred in his recollection of the name of the other."

the month, the president says that it "came into store this afternoon."

As the four locomotives which Mr. Allen ordered were, after they arrived in America, the earliest in this country, it is a subject of regret that the names of all of them cannot be established beyond all doubt. These locomotives were built late in 1828 and early in 1829 and while they were being built Mr. Allen returned to the United States and placed himself under the orders of the company which he served.

America arrived in New York on January 15, 1829; *Stourbridge Lion* arrived in New York on May 13, 1829; both sent up to Rondout on the steamboat *Congress*, where they arrived on July 3, 1829.

America set up on blocks in the yard of Abeel and Dunscomb, 375 Water Street, New York, and there demonstrated under steam on May 27, 1829.

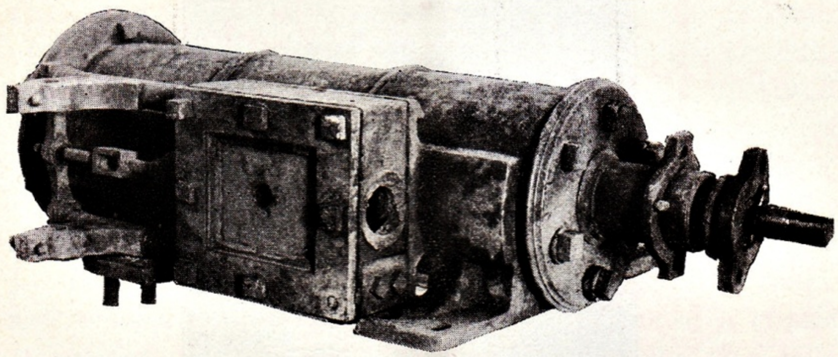
The *America*, accepting this name, was shipped from the Stephenson works at Newcastle on Tyne to London on October 20, 1828, and from London to New York on November 27, 1828, by the ship *Columbia*, arriving on Jauary 15. Delivered, it cost the company $3,663.30. It was unloaded and set up on blocks in the yard of Abeel and Dunscomb, foundrymen, at 375 Water street, and was there demonstrated under steam on May 27. At this time the *Stourbridge Lion* had also arrived in New York and on July 2 the *America* and the *Lion* were put on board the steamboat *Congress* and sent up the river to Rondout, which was reached on July 3. The original plan had been to transport both of them to Rondout on two canal boats which, at a cost of fifty dollars, were sent down the river for this purpose. Mr. Jervis, however, when informed of this intention by President Bolton, advised against it feeling that the risk of loss or damage to the locomotives would be too great if they were loaded on canal boats. The president therefore directed Mr. Flewelling in New York to arrange with the agent of the steamboat *Congress* to take the locomotives up the river and to tow the empty canal boats. The cost of this operation was seventy-five dollars, which included also freight charges on eighty pairs of wheels for the railroad cars. On July 16, these locomotives cleared from Eddyville and started up the canal. No record of the arrival of the *America* at Honesdale has been found and no mention of it is made in the corres-

July 16, 1829: *America* and *Stourbridge Lion* cleared from Eddyville and started up the canal. No record of the arrival of *America* at Honesdale.

In the Spring of 1923, W. J. Coughtry discovered that one of the cylinders on the *Stourbridge Lion* in the Smithsonian Institution was not part of the *Stourbridge Lion;* rather, it was one of the cylinders of the *America.*

pondence that exists in regard to the unloading of the *Stourbridge Lion.* The history, therefore, of the *America* from the time it started up the canal remains a mystery, except that, in the Spring of 1923, while investigating this subject, Mr. W. J. Coughtry, one of the compilers of this history, discovered in the Smithsonian Institution at Washington that a cylinder which on October 15, 1890, had been deposited there by Lindsay and Early of Carbondale, Pennsylvania, under the belief that it was a part of the *Stourbridge Lion,* was instead one of the cylinders of the *America.* With the assistance of Mr. H. W. Dickinson, Honorable Secretary of the Newcomen Society and Assistant to the Director of

W. J. Coughtry was one of the driving forces (along with George H. Burgess and Henry Opdyke) of *Century of Progress.* See also W. J. Coughtry, "A Century of Anthracite The Hundredth Anniversary of the Arrival of the First Cargo to Reach New York City, *The Delaware and Hudson Company Bulletin,* December 15, 1928, pp. 373-77, 379-380).



Cylinder of the *America.*

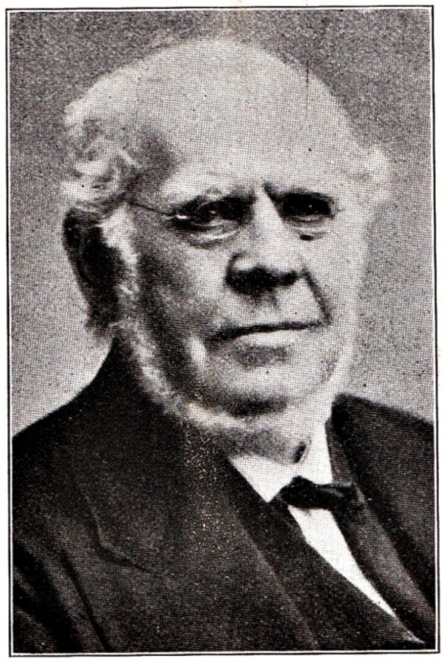
the Science Branch of the British Museum, photographs of the cylinder in its entirety and of its parts were submitted to Robert Stephenson and Company for examination. That firm has identified the cylinder represented as being beyond all reasonable doubt the cylinder of the locomotive which it constructed for the company at the request of Mr. Allen.

Stourbridge Lion arrived in New York on May 13, 1829. It was then taken to the shops of William Kemble, the agent of the West Point Foundry and set up on blocks and there demonstrated under steam on May 28, 1829.

The *Stourbridge Lion* was shipped from Stourbridge to Liverpool in February, 1829, and from Liverpool on April 8, 1829, by the ship *John Jay,* reaching New York on May 13. It cost the company, delivered, $2,914.90. It was unloaded and taken to the shops of William Kemble, the agent of the West Point Foundry, and was set up on

In his 1883 letter to the editor of the New York *Evening Post*, Horatio Allen said: “It was one of the Stephenson engines that was set up in New York, and not the *Stourbridge Lion.”*

blocks and demonstrated there under steam on May 28. The railroad of the company was now nearly completed and the Managers were eager to have one of the locomotives make a trial run. Although the *America* had arrived in New York earlier than the *Stourbridge Lion* and was, therefore, in a sense the ''first born,'' the *Stourbridge Lion* was selected for this purpose. As stated, it was sent up the river with the *America* on July 2, 1829, and reached Ron-



Horatio Allen in later life.

dout on July 3. From Eddyville it started up the canal on July 16 to Honesdale. The exact date of its arrival at Honesdale is not known, but in a letter dated July 20 President Bolton wrote from Honesdale that the locomotives were expected to arrive on July 22, and vouchers have been found covering labor for raising and moving an engine on July 24. Horatio Allen was waiting at Honesdale to receive the *Stourbridge Lion*, and under his

"The exact date of its *[Stourbridge Lion]* arrival at Honesdale is not known."It was expected to arrive there on July 22, 1829.

"Horatio Allen was waiting at Honesdale to receive the *Stourbridge Lion,* and under his direction it was placed upon the track."

Horatio Allen's epoch-making trial run of the *Stourbridge Lion* on August 8, 1829

The line over which the trial run of the *Stourbridge Lion* took place

direction it was placed upon the track. Under date of August 5 Mr. Jervis reported to President Bolton: "We have the *Lion* on the Rail Road and shall probably put steam on her tomorrow or next day." On August 8, 1829, Mr. Allen, unaided and alone, drove the *Stourbridge Lion* upon an epoch making round-trip, partly over a curved trestle, three miles into the woods of Pennsylvania to the site of Seeleyville, returning to the starting point by reversing his engine. He subsequently said that before starting the locomotive, the general opinion of the lookers-on was that either the road would break down under the weight, or, if the curve was reached in safety, the locomotive would not follow it upon the track and that his decision to ride alone was formed in order not to expose the life or limbs of more than one person to any danger that might actually exist. Fifty years later Mr. Allen revisited the spot and walked over the route, again alone, that with memories pouring in he might realize and estimate the progress of the amazing half a century that had intervened.

The line over which this run took place was straight for about six hundred feet and parallel with the canal, and crossed the Lackawaxen creek by means of a trestle thirty feet high on a curve nearly one-fourth of a mile long having a radius of seven hundred and fifty feet. The track then continued, in nearly a straight line, into the forest.

The road was built with rails of hemlock stringers six inches by twelve inches set on edge and of twenty and thirty feet lengths, held together by cross ties at intervals of ten and fifteen feet, supported on posts set in broken stone or on stone piers. The running surface of the rails was protected by wrought iron straps two and one-half inches wide, half an inch thick, about fifteen and one-half feet long, secured to the wooden rail by wood screws. These bars were punched with slotted holes countersunk for the heads of the screws with which they were to be fastened to the wooden rails and the upper corners of the

bars were rounded in rolling to a quarter circle having a radius of three-sixteenths of an inch. One end of each bar was finished with a tongue five-eighths of an inch wide and three-fourths of an inch long which fitted into an equivalent recess in the adjoining end of the next bar. The hemlock proving too soft, strips of hard wood one and one-half inches thick and four inches wide were later spiked to the top of the hemlock rails and the iron bars were spiked to these hard wood strips. This construction, with wooden rails and trestles at many points, was found to be inadequate evenly to sustain the weight and thrust of the locomotive and was considered unsafe. Very reluctantly, the Managers of the company found it necessary to abandon, for a number of years, the use of locomotives upon this railroad. But this three-miles run of the *Stourbridge Lion,* on August 8, 1829, is an historic event of prime significance and will never be forgotten. It was the first operation of any railroad locomotive in America and antedated by two months the famous Rainhill trials on the Liverpool and Manchester railroad, where the prize winning *Rocket* established the practicability of steam railroad transportation.

This trial run of the *Stourbridge Lion* on August 2, 1829 "was the first operation of any railroad locomotive in America and antedated the famous Rainhill trials on the Liverpool and Manchester railroad…"

The date of this trial run at Honesdale is fixed beyond any possibility of doubt by a report of Mr. Jervis to President Bolton on August 8, 1829, as follows:

"This morning we put steam on the Locomotive for the first time, and by giving her motion in this way brought the entire strain we have to provide for. The result has led us to the conclusion that our curved road with fifteen feet streaches will require additional support. When the streaches are ten feet, we think it will do the work we calculate for. We have not had much trial on straight road that has fifteen feet streaches, but so far as we had opportunity there is not apparently any important deficiency in strength — not such as to induce us to believe there will be any immediate necessity for additional support. I am not able to state the amount of work of this kind that will need additional strength — but the quantity is not great. The engine goes round the curves very well — the difficulty being in the road as above mentioned. The locomotive will I think fully answer our expectations, when we

get the road firm enough to bear it. So far I think all the difficulties discovered can be easily remedied, though it must necessarily be at some loss of time — which is greatly to be regretted though unavoidable. I have adopted what appeared in fact the only course, (to make every arrangement) in our power to secure those parts of the work that are deficient in strength."

On September 9, 1829, a second trip on rails of the *Stourbridge Lion* was made.

Horatio Allen: "The railroad as it now stands is not sufficiently stable for the operation of the Locomotive."

It has hitherto been the belief that following this trip the locomotive was removed from the track and never again used. This is not the case. It was again run on September 9 as shown in a letter from Horatio Allen, dated Honesdale, September 13, which states:

"On Wednesday last we had the engine in motion again and its operation and effect on the road carefully observed. The railroad as it now stands is not sufficiently stable for the operation of the Locomotive. Before it is put to work on it the road ought to be carefully examined and strengthened, without doing so it would be unsafe to put the engine at work."

The *Stourbridge Lion* was removed from the tracks and stored alongside the track there until about 1849, when it was taken to Carbondale "where the boiler was put into use in the company's blacksmith shop and many other parts also worked up for use. The boiler remained in this service for over twenty years, until replaced by one of higher power. Subsequently it was sold, and in the Eighties it was located, again in Carbondale, in the foundry yard of Lindsay and Early."

RE: "…until about 1849."It was moved to Carbondale in 1852—see Yarington letter on the following page.

After this second trial run the *Stourbridge Lion* was removed from the rails and stored alongside the track. In fact for a time it suffered some of the indignities that are the lot of the discarded. As Winter approached it was given a rough covering of boards to protect it from the weather. It remained housed in this or other rude manner until about 1849. It was then taken to Carbondale, where the boiler was put into use in the company's shop and many of the other parts also worked up for use. The boiler remained in this service for overy twenty years, until replaced by one of higher power. Subsequently it was sold, and in the Eighties it was located, again at Carbondale, in the foundry yard of Lindsay and Early. On June 18, 1889, that firm deposited it in the Smithsonian Institution at Washington. A number of the other parts of the *Stourbridge Lion* have also been deposited there, where, partially reconstructed, this locomotive now stands, safeguarded by the Eagle of the Republic among whose mountains it was the first to puff its smoke.

On June 18, 1889, Lindsay and Early deposited the *Stourbridge Lion* in the Smithsonian Institution, Washington, DC

On January 29, 1830, in a report to the president, Mr. Jervis said, with reference to the locomotive and the track

57

Dilton Yarington: “In 1852 I was at work for the Company in their Blacksmith shop in Carbondale and one day two car loads of old iron was on the branch in front of the shop, all the pieces were thrown off except the Boiler, I knew it well, it seemed like an old friend, and it was said to belong to John Simpson jr. that he had purchased the old Stourbridge Boiler of the Co. to use in his foundry. I afterwards saw it in his foundry, he sold it to John Stuart, who used it a number of years, and sold it to Mr. Early where I saw it frequently in the foundry on his premises. I am positively sure that it is the same boiler I saw in 1829 at Honesdale <u>when the Sourbridge was altogether</u> [emphasis added]. I have not seen it for the last twelve or fourteen months. [signed] D. Yarington”

Carbondale June 1— 1883

R. Manville Esqr;

Sir, Yesterday Mr Pierce Butler was speaking to me with regard to my knowledge of the history of the Steam Engine, “Stourbridge” I will now state all that I know about it. In 1828 or 29 I went with five or six other young men from Dundaff to Honesdale, to see a Locomotive Engine, called Stourbridge which the D.&H. C. Co. had procured from England to use on their Rail Road between Carbondale and Honesdale. We saw it tried for the first time on one of the tracks of of the Company. It was run by a man named Allen. I examined it closely before it was run, I had a curiosity to do so, because it was the first one I had ever seen. I heard a number of Mechanics and others express the opinion that it would not answer the purpose for which it was procured, and that none of the Co.' Trestle works were sufficiently strong, to have an Engine of seven tons weight run over it. In 1842 I saw the Engine again at Honesdale under an old leaky board shed, and it was covered with rust, but I knew it to be the same one I had seen twelve or thirteen years before. In 1852 I was at work for the Company in their Blacksmith shop in Carbondale, and one day two car loads of old iron was run on to the Branch in front of the shop, all the pieces were thrown off except the Boiler, I knew it well, it seemed like an old friend, and it was said to belong to John Simpson jr, that he had purchased the old Stourbridge Boiler of the Co. to use in his foundry, I afterwards saw it in his foundry, he sold it to John Stuart, who used it a number of years, and sold it to Mr Earley where I saw it frequently in the foundry or on his premises. I am positively sure that it is the same Boiler I saw in 1829 at Honesdale when the Stourbridge was altogether. I have not seen it for the last twelve or fourteen months.

D. Yarington

Dilton Yarington and “five or six other young men from Dundaff” went to Honesdale to watch the trial run of the *Stourbridge Lion* on August 8, 1829.

Note that there is only one “r” in the name *Yarington.*

Letter, D. Yarrington, 1883, as to disposition of boiler of the *Strourbridge Lion.*

“Yarington” spelled incorrectly

Effect on the price of D&H stock when the news of the outcome of the trial run of the *Stourbridge Lion* reached Wall Street

The third locomotive from England arrived in New York on August 9, 1829 (the day after the trial run of the *Stourbridge Lion).*

The fourth locomotive from England arrived in New York on September 17, 1829.

Engines No. 3 and 4 were shipped up to Rondout in the September/October 1829 and were put in storage there.

structures: "At the time I presented my plan of the work to the Board, Locomotives were in high reputation in England. I explored every means of information to which I could gain access, to ascertain their influence on the road, and particularly their lateral pressure in curve lines,—with reference to the latter, I could find no intimation of the severity of their operation." It had been the intention to have engines of one and one-quarter tons on a wheel but the builders had but little experience and the weight on each wheel was found to be nearly two tons. About the middle of August, 1829, when the news reached Wall street that, at some points, this little railroad could not adequately sustain the imported locomotives, the stock of the company became weak; and in a single day its price fell from eighty-two dollars to seventy-four dollars per share. Within two months, however, on October 9, 1829, the first load of coal passed over the railroad.

As stated, the names of the other two locomotives probably were the *Delaware* and the *Hudson*. These locomoties were, of course, the second and third built by Foster, Rastrick and Company under Mr. Allen's order. There is no record, however, whether, as manufactured and exported, the third and fourth were called respectively the *Delaware* and the *Hudson* or vice versa. Whatever the order of the names, the third locomotive was forwarded from Liverpool on June 21, 1829, by the ship *Splendid* reaching New York on August 9, and the fourth was forwarded from Liverpool on August 8 by the ship *John Jay* reaching New York on September 17. The cost of the third, delivered in New York, was $2,944.40 and of the fourth $2,992.90. Both were forwarded to Rondout, the first of these two, with the exception of the cistern, on the sloop *Cornelia* which left New York on September 6, the cistern following on the steamboat *Congress* on September 7, and the second on the sloop *Cornelia*, leaving New York on October 3 or 4. The boiler of the last locomotive was not loaded on the *Cornelia* but was sent up the river on

(Page 60 of *COP* is the well-known elevation/distance profile of the Gravity Railroad, and we have not given that profile here.)

COP continues:

“If Mr. McEntee’s statements as to storage can be credited, then he fourth locomotive was also stored [at Rondout].”

the sloop *Forrester* on October 21. After reaching Rondout, the later history of the *Delaware* and the *Hudson* is extremely uncertain, beyond the fact that as already stated the third locomotive was put ‘‘into store’’ on September 22. If Mr. McEntee’s statements as to storing can be credited, then the fourth locomotive was also stored, and it may be that a subsequent fire explains why all trace of them has disappeared.

As soon as it was shown, by the trial runs at Honesdale, that the *Stourbrige Lion* was too heavy for the track, the Managers initiated estimates of the time and cost required to adapt the track structure to the unexpectedly heavy weight of the locomotives but on the advice of Mr. Jervis they deferred an actual decision to undertake the improvements necessary, with the result that other business relegated to one side all immediate plans for reconstruction.

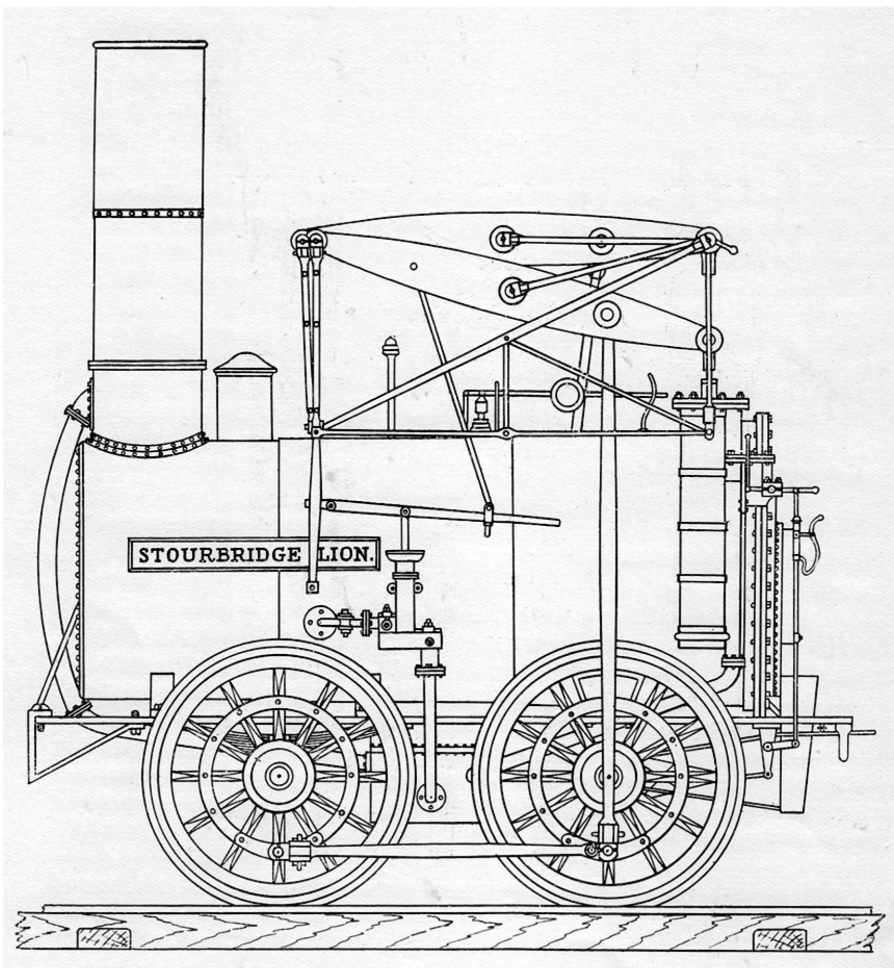
Early in the Winter of 1829 the Delaware and Hudson Canal Company again felt the need of additional capital and on January 13, 1829, it presented a petition or memorial to the New York Assembly asking financial aid. As doubt still remained, in some minds, as to whether anthracite would burn, Mr. Allen was ordered to Albany during the early months of the year to be of such service as he could render. On February 17, in the Assembly Mr. Bradish, from a committee of that body, made a report recommending a loan to the company of $500,000. On April 30, a measure to extend state credit to the company passed the Assembly by a vote of forty-nine to forty-two; and on May 2 such a bill fixing the amount of aid at $300,000 passed the Senate by a vote of fifteen to eight, receiving immediately the governor’s signature. This loan bore interest at four and one-half per cent instead of five per cent which the state required in 1827. Like the aid granted in 1827, this act required the company to furnish security by assignment of its property by way of mortgage or otherwise.

Following the publication of *Century of Progress* in 1923, the "four engines" version of D&H history was adopted by all railroad historians, starting with L. F. Loree in 1924.

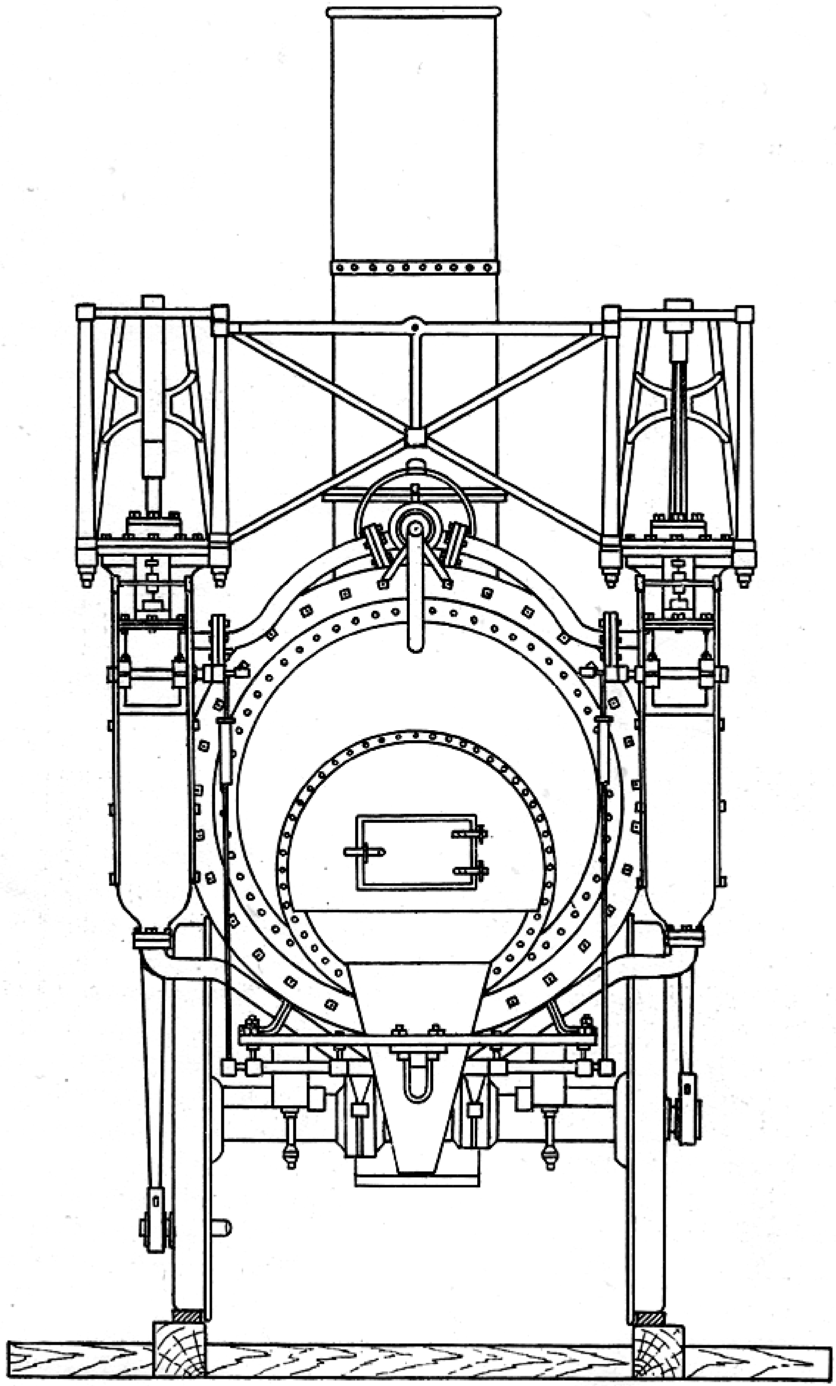
41. 1924:

Loree's "Four Engines. . ." paper at The Newcomen Society in 1924:

The Four Locomotives Imported into America in 1829 by the Delaware and Hudson Company by L. F. Loree, M.Sc., Excerpt Transactions of The Newcomen Society, (Read at Prince Henry's Room, Fleet Street, March 5th, 1924; Loree, the President of the Delaware and Hudson Co., was not able to be present, and the paper was read by the Hon. Secretary, Mr. Dickinson) Vol. IV., 1923-24, two line drawings of *Stourbridge Lion,* following p. 4:



RASTRICK'S LOCOMOTIVE "STOURBRIDGE LION" 1829,
FOR THE DELAWARE AND HUDSON CO.
After an original drawing.



RASTRICK'S LOCOMOTIVE "STOURBRIDGE LION" 1829,
FOR THE DELAWARE AND HUDSON CO.
After an original drawing.

Loree's "The Four Locomotives. . .," p. 7, on the question of the *Delaware* and the *Hudson (The Stourbridge Lion* was the first of the three Foster, Rastrick & Co. engines.):

The second locomotive constructed by Foster, Rastrick & Co., named either the "Delaware" or the "Hudson," which, is not known, was forwarded from Liverpool on June 21, 1829, in the ship "Splendid," and arrived in New York on August 9th, and cost delivered in New York $2,944.40. This locomotive, with the exception of the "cistern" which could not be found in the "Splendid," was loaded on the sloop "Cornelia" on Saturday, September 5th, and left New York for Rondout on September 6th. The cistern was located in the "Splendid" on September 7th, and sent to Rondout in the steamboat "Congress." The articles sent up by the "Cornelia" were "placed into store" on the afternoon of September 22nd.

The third Foster, Rastrick & Co. locomotive, named either the "Hudson" or the "Delaware," which, is not known, was forwarded from Liverpool in the "John Jay" on August 8, 1829, arrived in New York on September 17, 1829, and its cost to the company delivered at New York was $2,992.98. This locomotive, with the exception of the boiler, was sent up the river to Rondout in the "Cornelia" on probably October 3rd or 4th, as per two letters recently discovered, Samuel Flewelling, Treasurer, to B. J. Seward, the Company's agent at Rondout, dated respectively October 2 and 5, 1829, the former:

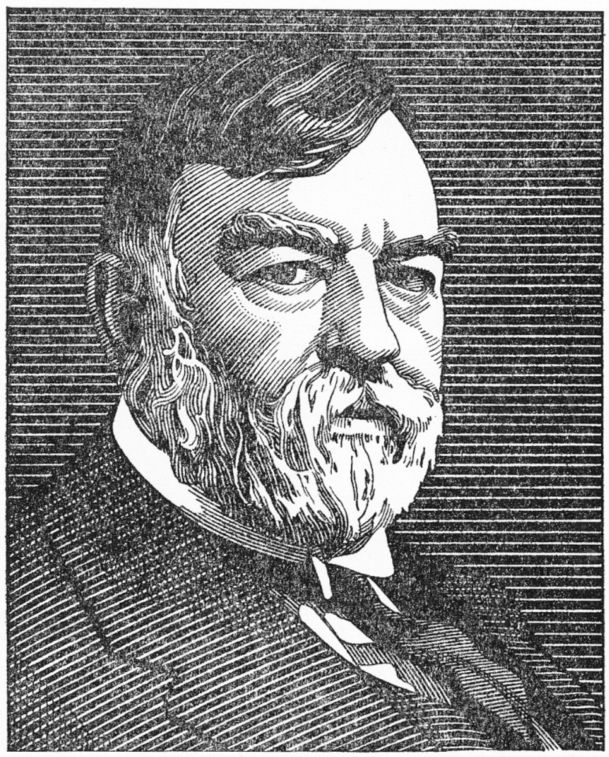
> "The locomotive engine will be sent up by the Cornelia, and consists of the following packages:
>
> No. 20 to 27—8 Boxes
> 28—1 Boiler
> 29—1 Chimney
> 30—2 Axle Trees
> 31—4 Wheels
>
> and you will please see that all of these items are received,"

and the latter:

> "Capt. Goetchies took everything on board on Saturday belonging to the engines, as stated in my letter dated the 2nd, except the boiler. It was after dark on Saturday evening before he got along side of the wharf where it had been landed from the ship, and I was unwilling to run the risk of his taking it on board. Without a great number of men to move it, it appeared to me the frame on which it rests might be materially injured, if nothing worse occurred. I shall send it to Abeel & Dunscomb on a truck, from whence it can be taken by any of the sloops taking coal to them."

The box or case numbers and contents shown above tally with those given in the bill of lading, the policy of insurance on, and the "particulars" or description of the parts in each box of the third and last Foster, Rastrick & Co. locomotive which arrived in the "John Jay."

L. F. Loree: engraving “From the portrait which hangs in President’s Office of The Delaware & Hudson Corporation at New York” Reproduced here from page 2 of *L. F. Loree (1858-1940) Patriarch of the Rails!* By Charles Penrose, 1955. Loree was president of the D&H for 31 years, beginning in 1907.

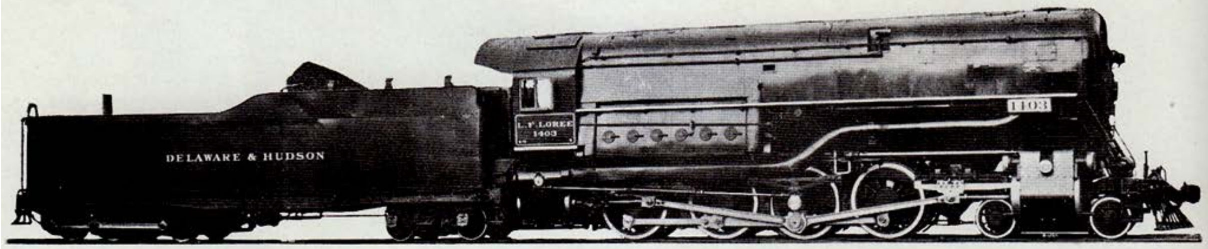


L. F. Loree
(1858-1940)

Note on the presentation of the Loree paper on the *Stourbridge Lion* to the Newcomen Society in London in 1924, and the engine named *America* by Clement Stratton:

“In 1924, when D&H President L F Loree presented his paper to the Newcomen Society in London he used the name *America,* to be pulled up sharply by Secretary Dickinson, who pointed out that the name was a fiction engineered by Stretton due his misreading of the Description Book.” *(State,* p. 54)

Here is a portrait of the D&H Locomotive, the *L. F. Loree*, that is given in R*ailroadians. .* , p. 94:



L. F. LOREE

Built by American Locomotive Company in 1933. Type 4-8-0. Gauge of Track 4′8½″. Cylinders, Diameter High Pressure 20″, Intermediate Pressure 27½″, Low Pressure 33″, Stroke 32″. Driving Wheel Diameter 63″. Boiler, Water Tube Type, Diameter 68-1/16″. Pressure 500 Pounds. Fire Box, Length 139-15/16″, Width 77¾″. Tubes, Superheater 52, Diameter 5½″, Length 15′0″, Regular 155, Diameter 2″, Length 15′0″. Wheel Base, Driving 18′10″, Engine 33′9″, Engine and Tender 83′8¾″. Weight in Working Order: Leading Truck 69000 Pounds, Driving 313000 Pounds, Engine 382000 Pounds, Engine and Tender 608400 Pounds. Fuel, Bituminous. Heating Surface: Tubes 1209, Flues 1116, Fire Box 965, Arch Tubes 61, Total 3351 Square Feet, Superheater 1076 Square Feet. Tractive Power: Simple at 500 Pounds Boiler Pressure 91500 Pounds, Triple at 500 Pounds Boiler Pressure 76200 Pounds. Tender Booster at 500 Pounds Boiler Pressure 18000 Pounds. Tender Capacity, Water 14000 Gallons, Fuel 17½ Tons. Equipped with Rotary Type Poppet Valves, Roller Bearings on Main Axle Boxes, Roller Bearings on Side and Main Rod Bearings of Main Crank Pin.

42. March 1, 1926:

The following article by W. J. Coughtry about the Stourbidge Lion was published in *The Delaware and Hudson Company Bulletin* on March 1, 1926, pp. 7, 11-12:

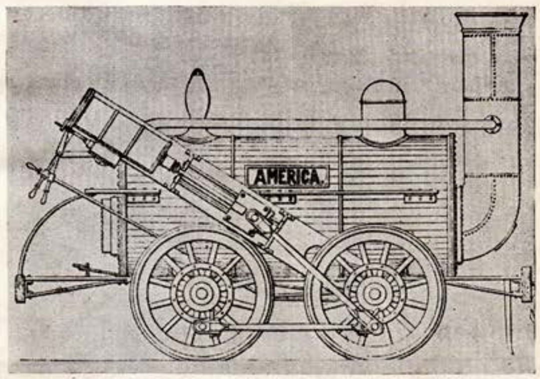
Introduced First Locomotive

Credit for Introduction and First Use of the Steam Locomotive in America, which was in 1829, Belongs to Our Company

By W. J. COUGHTRY

W. J. Coughtry expresses here the official D&H position on the engines ordered by Allen in England.

CREDIT for the introduction and first use of the steam locomotive, the chief factor in the growth of our commerce and transportation in the Western Hemisphere, belongs to The Delaware and Hudson Company which received its charter from the State of New York on April 23, 1823.



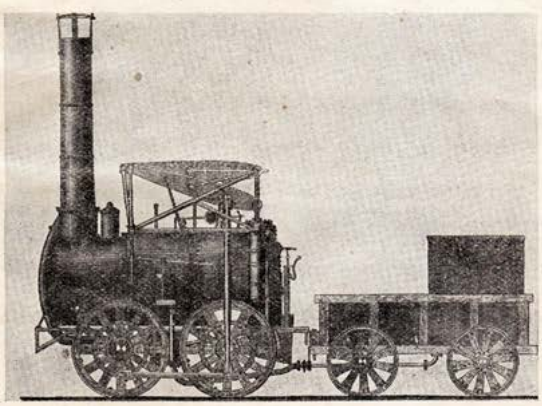
First Locomotive to Reach America

In constructing its canal, then the only recognized practical means of transportation in this country, from the Hudson river to the coal bed at Carbondale it became necessary to locate its western terminus at the headwaters of the Lackawaxen river at the forks of the Dyberry, now Honesdale, as its continuance across the Moosic mountains, which lie between Honesdale and Carbondale, was not feasible. John B. Jervis, then chief engineer, adopting the view of his predecessor, Benjamin Wright, worked out a plan for a railroad across these mountains. This plan divided the railroad into two parts—inclined planes and levels. On the inclined planes loaded and empty wagons, as cars were then called, were to be raised and lowered by means of chains and ropes driven by stationary engines or by water power, and on the levels the track was to be constructed with descending grades to enable the loaded cars to move by gravity. The use of the locomotive was planned for the return movement of the empty cars. This plan the Board of Managers adopted and Horatio Allen, an assistant engineer in the Company's service was sent to England where locomotives had been but recently put into use, to study their operation and if found practical to contract for four locomotives for use on the levels, and for iron rail for the entire road.

The *Stourbridge Lion* was designed by John Urpeth Rastrick. (Leslie, *Honesdale and the Stourbridge Lions*, p. 116). See also p. 40, herein.

Mr. Allen left New York on January 24, 1828, arrived at

(Continued on Page 11)



The "Stourbridge Lion," first locomotive used in this country

Stourbridge Lion: horizontal boiler, with two36-inch stroke vertical cylinders with grasshopper type walking beams communicating motion to the iron-tired, oaken driving wheels.

Introduced First Locomotive

(Continued from Page 7)

Liverpool on February 15, and, following some little time spent in studying steam locomotive operation in England, contracted, on April 15, for about 390 tons of rolled iron strap rail and, early in July, for four locomotives—with Robert Stephenson & Company, of Newcastle-on-Tyne, for one, and with Foster, Rastrick & Company, of Stourbridge, for three, the weight of each of which was not to exceed one and one-quarter tons on each wheel.

The Stephenson locomotive, the *America*, was the first to reach America and arrived in New York on January 15, 1829. Its dimensions were:

Builder's number	12
Type	0-4-0
Diameter of boiler	49 inches
Length of boiler	9 feet, 6 "
Diameter of cylinders	9 "
Stroke of cylinders	24 "
Firebox	48 by 36 "
Diameter of drivers	48 "
Gauge	4 feet, 3 "
Boiler tubes	2
Diameter	19 "
Fuel	Anthracite
Cost (New York)	$3,663.30

Following a demonstration under steam in New York City on May 27, 1829, it was shipped to Rondout in the steamboat *Congress*, arriving there on July 3. It was started up the cânal, clearing from Eddyville on July 16. No record of its arrival at Honesdale, or at any other point on the canal, has been found. It was never put in service and its disposition is still a mystery beyond the finding, in the Smithsonian Institution at Washington, D. C., of one of its cylinders and the iron wheel straps or bands affixed to the spokes between the hubs and tires which had been deposited there under the belief that they were parts of the *Stourbridge Lion* and the latter applied in error to the replica of the wheels of the *Lion* now on the exhibition floor.

The first of the Foster, Rastrick & Company locomotives to arrive was the *Stourbridge Lion* which reached New York on May 13, 1829. Its dimensions were:

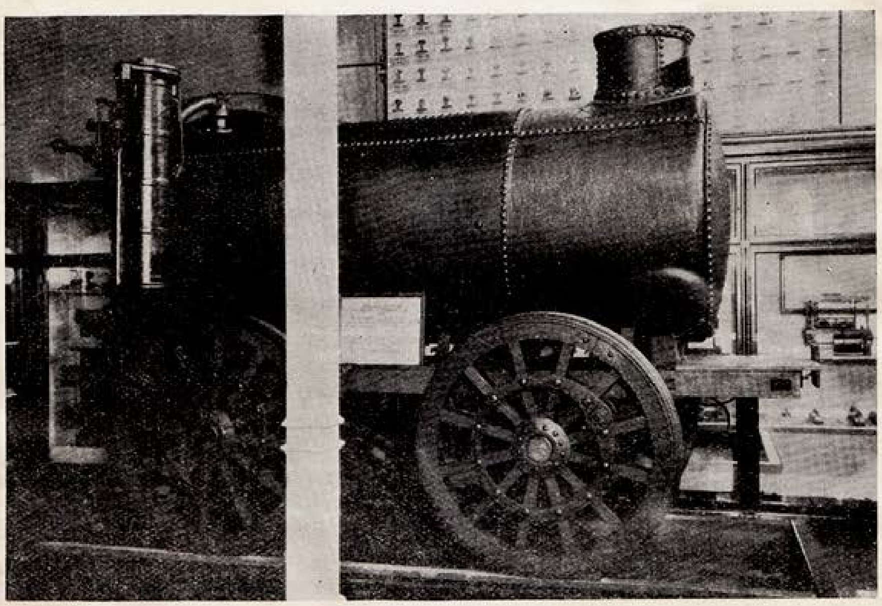
Builder's number	Unknown
Type	0-4-0
Diameter of boiler	4 feet, 2 inches
Length of boiler	10 feet, 6 "
Boiler tubes	2
Diameter of tubes	18 "
Length of tubes	4 feet
Diameter of cylinders	8¾ inches
Stroke of cylinders	3 feet
Firebox (cylindrical)	48 by 28 inches
Diameter of drivers	49 "
Gauge	4 feet, 3 "
Fuel	Anthracite
Cost (New York)	$2,914.90

This locomotive, the first to run on an American railroad, was demonstrated under steam in New York City on May 28, 1829, and shipped from New York in the steamboat *Congress* on July 2, arriving at Rondout on July 3. It cleared Eddyville, on the canal, July 16, for Honesdale. The exact date of its arrival at Honesdale is still unknown but was, in all probability, either July 22 or 24. There a tender was added, one of the coal "wagons" of the Company being fitted up for that purpose. It was placed on the track at Honesdale on August 5, made its famous trial trip on August 8, and was found too heavy for the track structure. A second trial was had on September 9, and its operation carefully noted by Mr. Allen who reported the railroad "not sufficiently stable" for its operation and that the road should be strengthened before it could with safety be put in service.

The locomotive was removed from the rails and stored under a rough board shelter for some time and later moved to Carbondale. Many of its parts were worked up for other uses and its boiler was in service in the shop at that place until replaced by one of higher power in the seventies. Subsequently, the boiler was sold and, in the late eighties, located in the foundry yard of Lindsay & Early, at Carbondale, who deposited it in the Smithsonian Institution, Washington, D. C., on June 18, 1889. Other parts of this famous locomotive have, from time to time, been found and added to the boiler, and now stand on the exhibition floor of the National museum, as shown in an accompanying photograph.

The other two Foster, Rastrick & Company locomotives, one the *Delaware* and the other the *Hudson*, were of similar design. The second, either the *Hudson* or the *Delaware*, which is not known, arrived in New York on August 9, 1829, and cost, delivered, \$2,944. It was sent to Rondout, part on September 6 and the remainder on September 7, and "placed in store" on September 22.

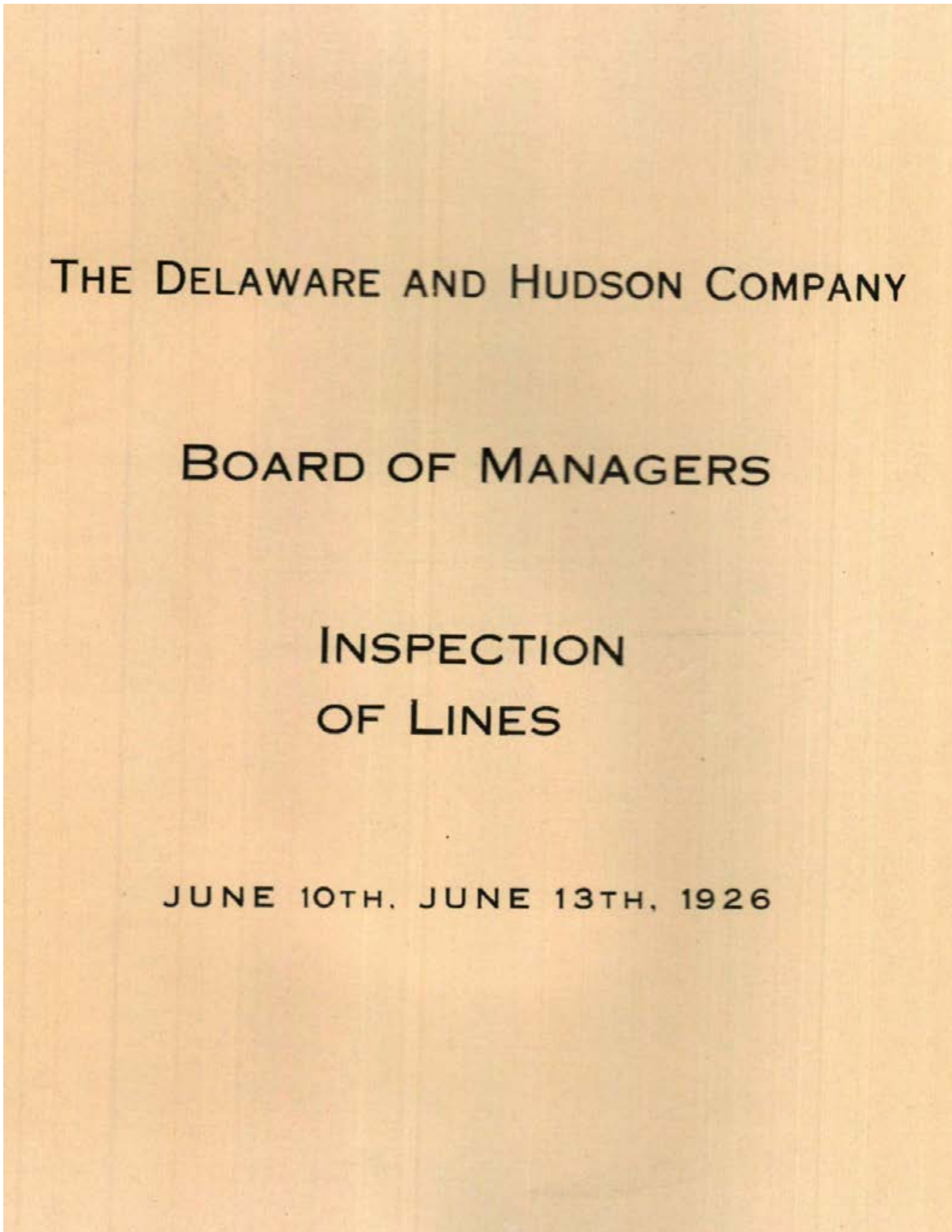
The third and last, either the *Hudson* or the *Delaware*, arrived in New York on September 17, 1829, and cost, delivered, \$2,992.98. It was forwarded to Rondout, part on October 6, and the remainder, the boiler, on October 21. Beyond the statement in the "Story of the Canal," by James S. McEntee, an early engineer on the Company's canal, written in 1874 and appearing in 1910 in the magazine "Old Ulster," published at Kingston, N. Y., in which he states that these two locomotives were finally stored in the "White storehouse near the present Clinton Hall and were burned up in a fire which destroyed the building," no further record of them has been found although intensive research has been made.



The "Stourbridge Lion" as it stands today in the Smithsonian Institution, Washington, D. C.

43. June 10th 13th, 1926:

Presented in the Delaware and Hudson Company's *Inspection of Lines* book, June 10th 13th, 1926 is the following material on the *Stourbridge Lion* and the other engines imported from England by the D&H in the early nineteenth century:

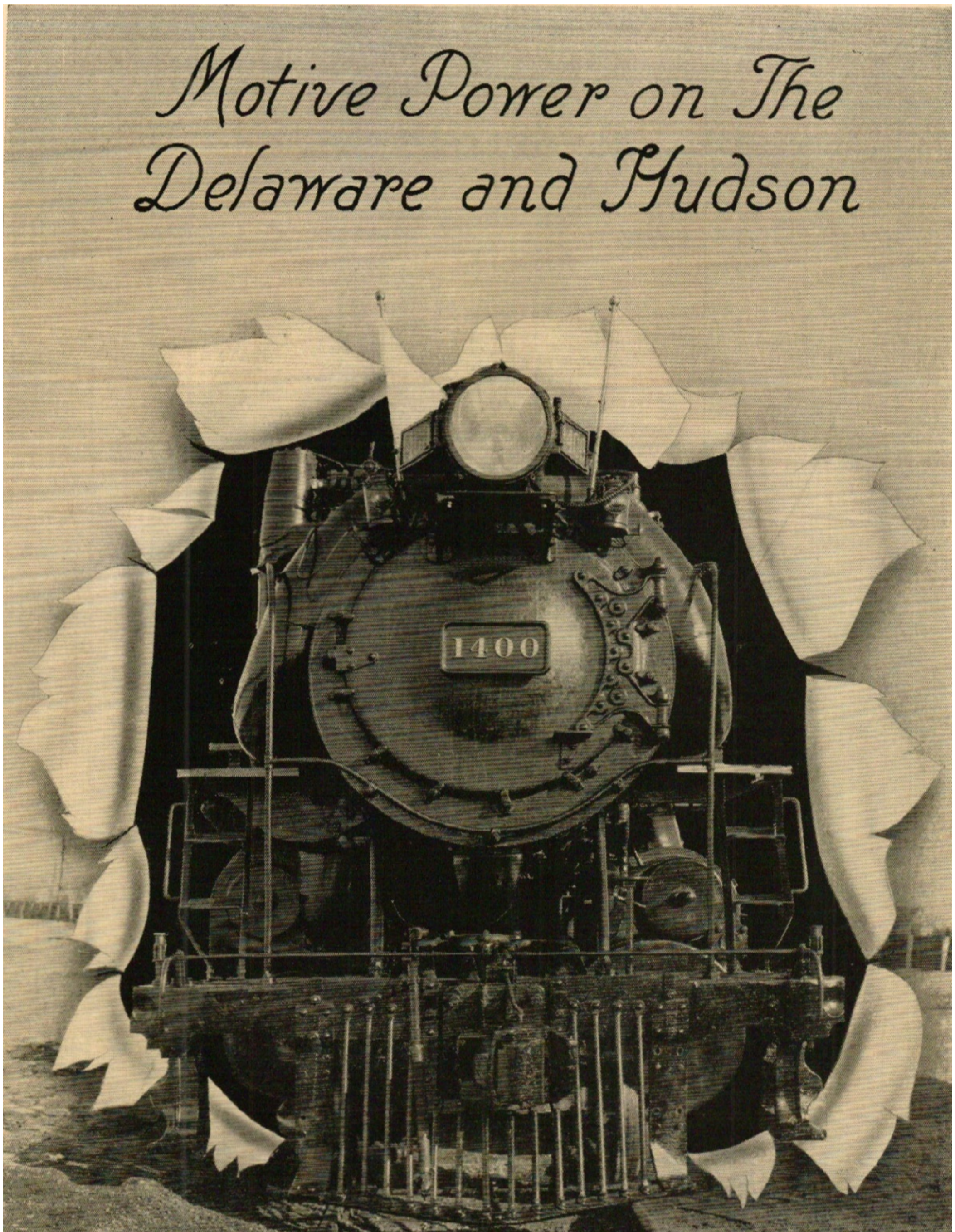


THE DELAWARE AND HUDSON COMPANY

BOARD OF MANAGERS

INSPECTION
OF LINES

JUNE 10TH. JUNE 13TH. 1926


Motive Power on The Delaware and Hudson
1400
THE HORATIO ALLEN
1924

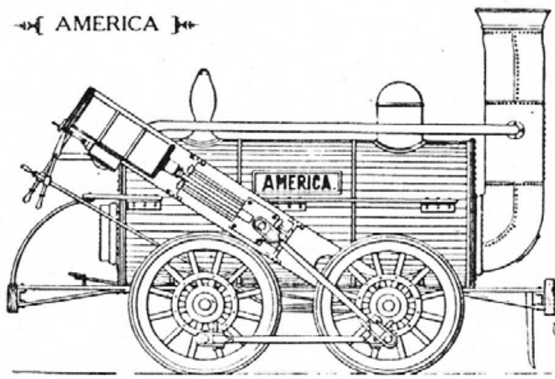
Period 1823 to 1830

Locomotives—4 *Mileage—3.0*

ON APRIL 23, 1823, the New York Legislature passed a special act to incorporate "The President, Managers and Company of the Delaware & Hudson Canal Company." Its recorded purpose was the mining and transportation of coal from the anthracite beds discovered somewhat earlier in the Lackawanna Valley. The movement from, what is now the City of Honesdale to Rondout, was to be by canal. From the western terminal of the canal to the coal beds, at or about Carbondale, a distance of approximately sixteen (16) miles, a canal was not feasible as the Moosic Mountains intervened.

For this reason, Mr. John B. Jervis, Chief Engineer of the Company, developed plans for a railway, which was to be divided into two parts — incline planes and levels. The loaded cars were to be raised and the empties lowered on the planes by cables, operated by steam engines, or water power, while the levels were to be constructed with sufficient inclination to permit of the loaded cars being operated by gravity, the return movement of which was to be handled by locomotives. These so-called levels were of approximately eleven (11) miles total length.

AMERICA



Built by R. Stephenson & Company, Newcastle-on-Tyne, October, 1828. Boiler, Diameter 49", Length 9'6". Tubes, Number 2, Diameter 19". Cylinders, Diameter 9". Stroke 24". Furnace 48"x36". Drivers, Diameter 48". Gauge 4'3". Engine had no Smoke Box. First Engine to reach America. Never set up. Arrived Rondout from New York July 3, 1829.

At this period (1827), as no experiments of moment had been made in America looking to the development of steam transportation, careful studies were made of the progress of the art in England, where, at best, the condition obtaining was more or less unsettled, and the future of the locomotive debatable.

So convinced, however, was Mr. Jervis of the feasibility of his plan and his presentation to the Management such, that a decision was reached to send Mr. Horatio Allen, Assistant Engineer, to England, to study railroad operation and to contract for rails and locomotives. Provided with the necessary credit and instructions, he sailed from New York, January 24, 1828.

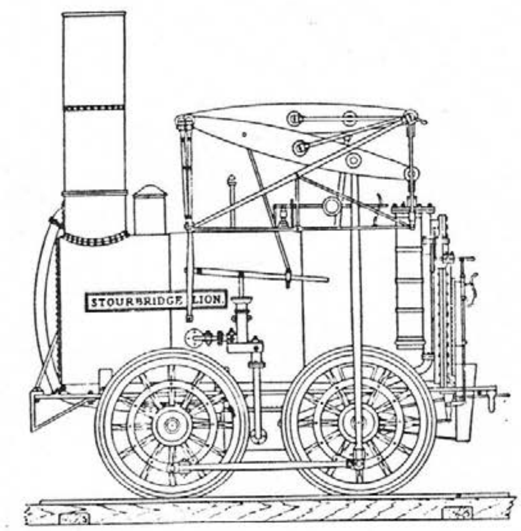
Four engines

America

His observations were so tempered with enthusiasm that on July 19, 1828, he reported having contracted for four (4) locomotives, one with the Robert Stephenson & Company, and three from Foster, Rastrick & Company. His contract for the one from the Stephenson Company, although some £110 higher in price, was explained as an appreciation of the assistance and information Mr. Stephenson and his son had given during his investigations—Mr. Stephenson, at this time, being the outstanding locomotive authority in England.

Illustration is given of the "America," furnished by Robert Stephenson & Company, which was shipped from the Company's Works at Newcastle-on-Tyne on October 20, 1828, and arrived in New York on January 15, 1829, THE FIRST LOCOMOTIVE IN AMERICA. This locomotive cost, delivered in New York, $3,663.30. It was transported up the Hudson River and through the canal from Rondout and cleared Eddyville on July 16, 1829. There its record is lost.

The three locomotives built by Foster, Rastrick & Company, of Stourbridge, England, were the "Stourbridge Lion," "Delaware" and "Hudson." Two illustrations are given of the "Stourbridge Lion."



AFTER AN ORIGINAL DRAWING

The "Stourbridge Lion" was completed and shipped from Stourbridge, England, February, 1829, and reached New York, May 13, 1829. It cost the Company delivered in New York, $2,914.90. It was transported up the Hudson to Rondout and by canal to Honesdale, reaching there late in July, 1829. It was set up and made its trial trip, August 8, 1829, this being the FIRST OPERATION OF A LOCOMOTIVE IN AMERICA.

In his progress report to the President of the Company, Mr. Jervis, under Date of August 8, 1829, wrote as follows:

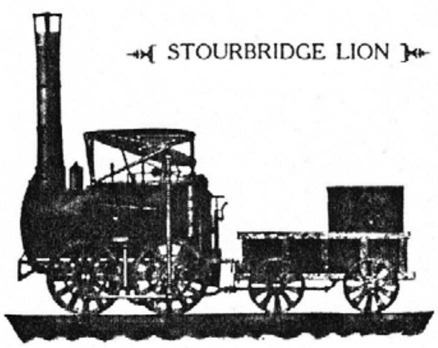
"This morning we put steam on the Locomotive for the first time, & by giving her motion in this way brought the entire strain we have to provide for. The result has led us to the conclusion that our curved road with 15 feet streaches will require additional support. When the streaches are ten feet we think it will do the work we calculated for. We have not had much trial on straight road that has 15 feet streaches, but so far as we had opportunity there is not apparently any important deficiency in strength— not such as to induce us to believe there will be any immediate necessity for additional support. I am not able to state the amount of work of this kind that will need additional strength—but the quantity is not great. The engine goes round the curves very well — the difficulty being in the road as above mentioned. The locomotive will, I think, fully answer our expectations, when we get the road firm enough to bear it. So far I think all the difficulties discovered can be easily remedied, though it must necessarily be at some loss of time, which is greatly to be regretted, though unavoidable. I have adopted what appeared in fact the only course (to make every arrangement) in our power to secure those parts of the work that are deficient in strength."

The track was strengthened and a second run was made on the 9th of September, 1829. Mr. Allen writing of this states:

"On Wednesday last we had the engine in motion again, and its operation on the road carefully observed. The railroad as it now stands is not sufficiently stable for the operation of the locomotive. Before it is put to work on it, the road ought to be carefully examined and strengthened, without doing so it would be unsafe to put the engine at work."

After this second trial the locomotive was removed from the rails and stored.

STOURBRIDGE LION



Built by Foster, Rastrick & Co., Stourbridge, England. Arrived in New York May 13, 1829. Gauge 4′ 3″. Boiler, Diameter 4′, Length 10′ 6″. Furnace, Length, 4′. Cylinders, Diameter 8¾″, Stroke 4′. Drivers, Diameter 49″. Height to Top of Stack about 15′ 0″. Flues 2, Diameter 17″, Length 4′. Tractive Power about 1750-2000 pounds.

The second and third locomotives from Foster, Rastrick & Company, were shipped from England on June 21, and August 8th, 1829, respectively, arriving in New York, August 9 and September 17, 1829. Their history thereafter is more or less shrouded in doubt. A student desiring a more complete history of these four interesting locomotives is referred to the monograph:

THE FOUR LOCOMOTIVES IMPORTED INTO AMERICA IN 1829 BY THE DELAWARE AND HUDSON COMPANY

By L. F. LOREE, *M. Sc.*

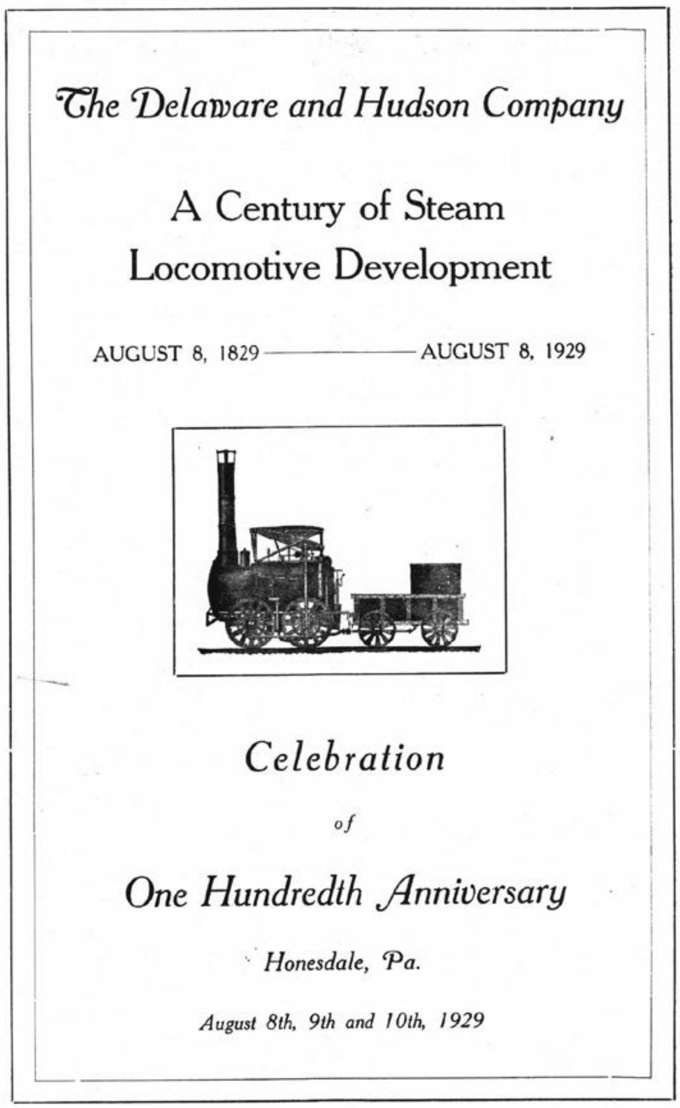
Excerpt Transactions of The Newcomen Society.
Vol. IV., 1923-24

44. August 8-10, 1929:

The centennial of the trial run of the *Stourbridge Lion* on August 8, 1829 was celebrated by the D&H on August 8-10, 1929. An eight-page commemorative flyer was produced by the D&H at that time. The flyer is titled:

"The Delaware and Hudson Company, A Century of Steam Locomotive Development, August 8, 1829—August 8, 1929. Celebration of One Hundredth Anniversary Honesdale, Pa. August 8^{th}, 9^{th} and 10th, 1929"

Here is a copy of that flyer:



The Delaware and Hudson Company

A Century of Steam
Locomotive Development

AUGUST 8, 1829 ———— AUGUST 8, 1929

Celebration

of

One Hundredth Anniversary

Honesdale, Pa.

August 8th, 9th and 10th, 1929

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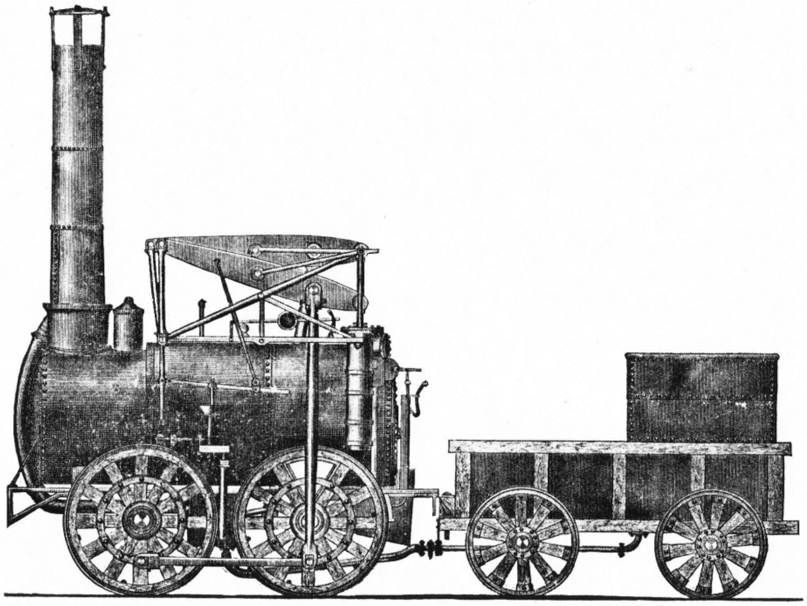
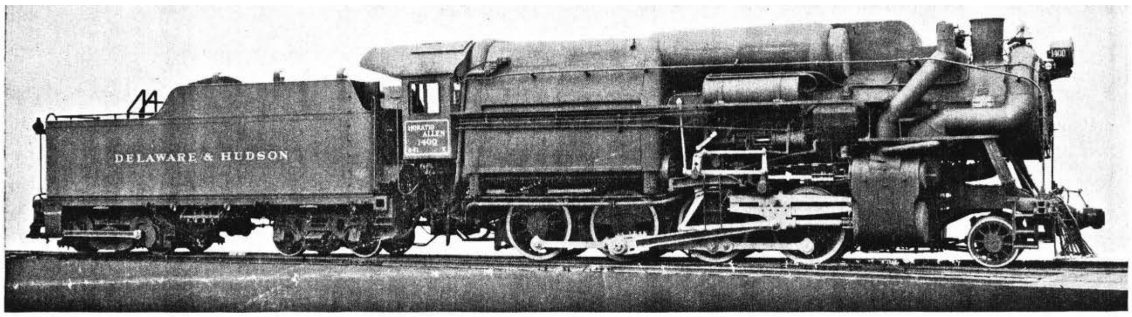
As illustrative of the progress made in the past century, the Delaware and Hudson Company has on exhibit three (3) locomotives,—the "Horatio Allen"—number 1400, and numbers 1117 and 652, representing the very latest development in freight and passenger motive power. The characteristics, with photographic illustrations, have been appended in this pamphlet. Illustration has also been given of the "John B. Jervis", number 1401, which represents a further development of the "Horatio Allen", number 1400, type. It is of more than passing interest to note, a third of this type is now under construction, having a boiler pressure of 500 pounds.



STOURBRIDGE LION

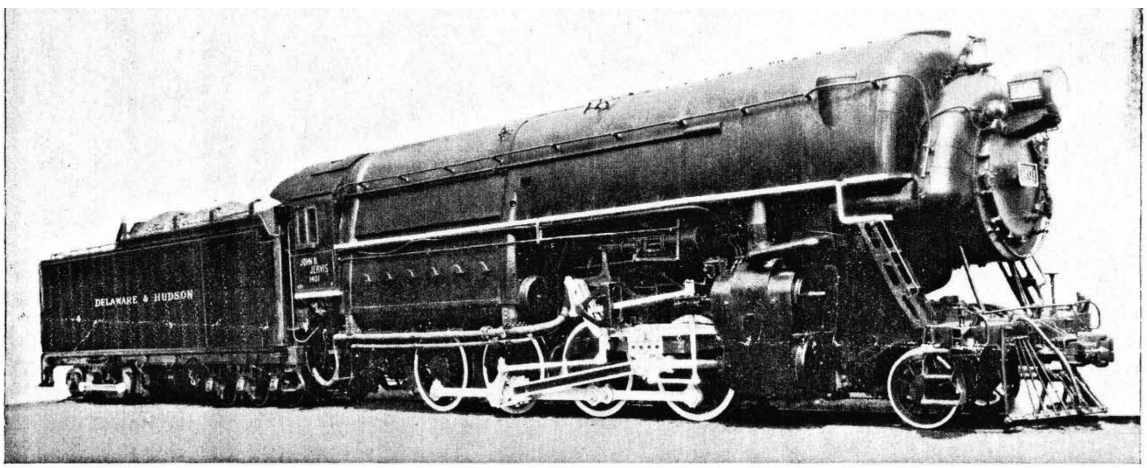
Type	0-4-0	Weight on Drivers	7 to 10 tons	Boiler, Grate Area, Sq. Ft.	8.5
Road	The Delaware & Hudson Canal Co.	Wheel Base, Drivers	5'-1"	Boiler, Tubes, No. and Diam.	2—17"
Builder	Foster, Rostrick & Co.	Wheel Base, Engine	5'-1"	Frame Width	4½"
Year Built	1829	Wheel Base, Tender	5'-9"	Frame Centers	44½"
Track Gauge	4'-3"	Wheel Base, Engine and Tender	17'-4"	Cylinder Centers	70"
Fuel	Coal	Boiler, Type	Horizontal	Driving Journals, Diam. & Lgth., Main	4" x 6"
Cylinders	8¾" x 48"	Boiler, Diameter	48"	Driving Journals, Diam. & Lgth., Others	4" x 6"
Diameter Drivers	49"	Boiler, Length over Tube Sheets	4'-0"	Height, Rail to top of Stack	15'-0"
Boiler Pressure	50 lbs.	Boiler, Length over Grates	3'-5"	Maximum Width	7'-7"
Tractive Effort	1750 to 2000 lbs.	Boiler, Width over Grates	2'-6"	Factor of Adhesion	8 to 10

Data developed from best sources available



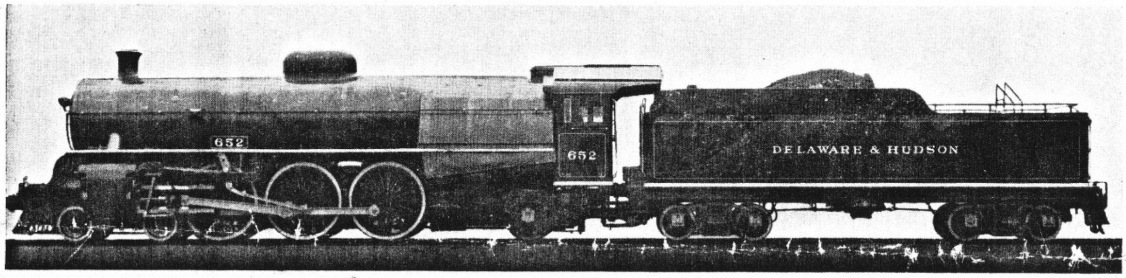
HORATIO ALLEN

Type	2-8-0	Tractive Effort, Max.	105,500	Weight, Total	510,000
Road	D. & H.	Firebox, Length	137″	Heating Surface:—	
Builder	A. L. Co.	Firebox, Width	75″	Tubes, sq. ft.	1132
Year Built	1924	Tubes, No. and Diam.	145—2″	Flues, sq. ft.	881
Track Gauge	4′-8½″	Flues, No. and Diam.	42—5⅜″	Firebox, sq. ft.	1124
Fuel	An.-Bit.	Tubes and Flues, Length	15′-0″	Arch Tubes sq. ft.	63
Cylinders	23½″ and 41″ x 30″	Wheel Base, Driving	18′-0″	Total, sq. ft.	3200
Diam. Drivers	57″	Wheel Base, Engine	29′-0″	Superheater, Sq. Ft.	579
Boiler Ins. Diam.	61-⅞″	Wheel Base, Eng. & Tndr.	65′ 7¾″	Combined, Sq. Ft.	3779
Boiler Pressure	350 lbs.	Weight, Eng. Truck	49,500	Grate Area, Sq Ft.	71.4
Tractive Effort, Simp.	85,800	Weight, Drivers	298,500	Factor of Adhesion	
Tractive Effort, Comp.	71,600	Weight, Engine	348,000	Simple	3.48
Tractive Effort, Booster	19,700	Weight, Tender	162,000	Compound	4.17



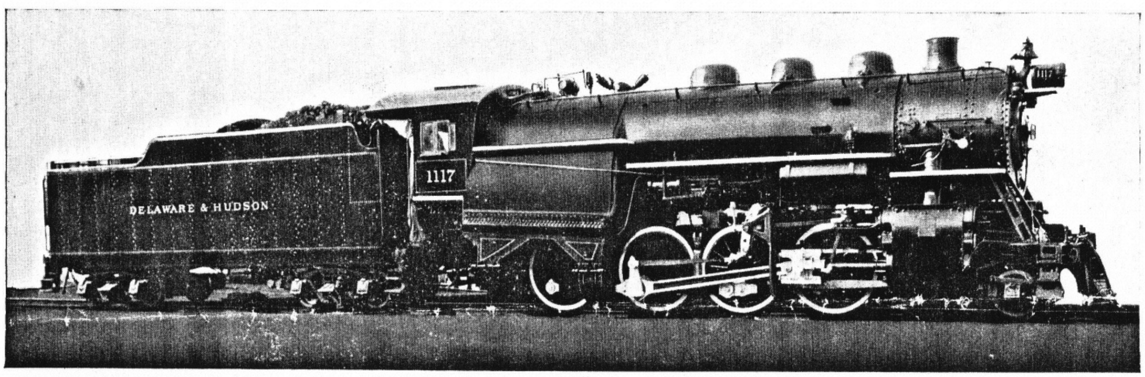
JOHN B. JERVIS

Type	2-8-0	Tractive Effort Max.	105,500	Weight, Total	581,700
Road	D. & H.	Firebox, Length	152″	Heating Surface:—	
Builder	A. L. Co.	Firebox, Width	77-⅝″	Tubes, sq. ft.	788
Year Built	1927	Tubes, No. & Diam.	101—2″	Flues, sq. ft.	1116
Track Gauge	4′-8½″	Flues, No. & Diam.	52—5½″	Firebox, sq. ft.	1150
Fuel	An. Bit.	Tubes & Flues, Lgth.	15′-0″	Arch Tubes, sq. ft.	67
Cylinder	22¼″ & 38½″ x 30″	Wheel Base, Driving	18′-0″	Total, sq. ft.	3121
Diameter Drivers	57″	Wheel Base, Engine	29′-0″	Superheater, Sq. Ft.	700
Boiler Ins. Diam.	61-⅞″	Wheel Base, Eng. & Tndr.	74′-11½″	Combined, Sq. Ft.	3821
Boiler Pressure	400 lbs.	Weight, Eng. Truck	41,500	Grate Area, Sq. Ft.	82
Tractive Effort Simp.	85,800	Weight, Drivers	295,000	Factor of Adhesion	
Tractive Effort Comp.	71,600	Weight, Engine	336,500	Simple	3.4
Tractive Effort Booster	19,700	Weight, Tender	245,200	Compound	4.2



LOCOMOTIVE 652

Type	4-6-2	Firebox, Width	108"	Weight, Total	443,800
Road	D. & H.	Tubes, No. & Diam.	30—2¼	Heating Surface:—	
Builder	D. & H.	Flues, No. & Diam.	142—3½"	Tubes, sq. ft.	344
Year Built	1929	Tubes & Flues, Lgth.	19'-7"	Flues, sq. ft.	2535
Track Gauge	4'-8½"	Wheel Base, Driving	13'-0"	Firebox, sq. ft.	246
Fuel	An.-Bit.	Wheel Base, Engine	35'-3½"	Arch Tubes, sq. ft.	37
Cylinders	22" x 28"	Wheel Base, Eng. & Tndr.	74'-8½"	Total, sq. ft.	3162
Diameter Drivers	73"	Weight, Eng. Truck	45,000	Superheater, Sq. Ft.	1495
Boiler Ins. Diam.	74½"	Weight, Drivers	185,300	Combined, Sq. Ft.	4657
Boiler Pressure	260 lbs.	Weight, Trailer	53,000	Grate Area, Sq. Ft.	87.09
Tractive Effort	41,600	Weight, Engine	283,300	Factor of Adhesion	4.45
Firebox, Length	116-⅛"	Weight, Tender	160,500		



LOCOMOTIVE 1117

Type	2-8-0	Firebox, Length	120-9/32"	Weight, Total	471,000
Road	D. & H.	Firebox, Width	114"	Heating Surface:—	
Builder	D. & H.	Tubes, No. & Diam.	265—2"	Tubes, sq. ft.	2177
Year Built	1929	Flues, No. & Diam.	40—5-⅜"	Flues, sq. ft.	883
Track Gauge	4'-8½"	Tubes & Flues, Lgth.	15'-9½"	Firebox, sq. ft.	257
Fuel	An.-Bit.	Wheel Base, Driving	17'-6"	Arch Tubes, sq. ft.	60
Cylinders	25" x 32"	Wheel Base, Engine	27'-3½"	Total, sq. ft.	3377
Diameter Drivers	63"	Wheel Base, Eng. & Tender	70'-3"	Superheater, Sq. Ft.	775
Boiler Ins. Diam.	82"	Weight, Eng. Truck	28,000	Combined, Sq. Ft.	4152
Boiler Pressure	250	Weight, Drivers	270,000	Grate Area, Sq. Ft.	95.2
Tractive Effort	68,500	Weight, Engine	298,000	Factor of Adhesion	4.35
		Weight, Tender	173,000		

Two articles about the early D&H engines were published in *The Delaware and Hudson Company Bulletin* at the time of the *Stourbridge Lion* centennial celebrations in 1929. In the August 15, 1929 edition of that publication, there is an article (p. 250) about the *America*. Here is that article:

The
Delaware and Hudson Company
BULLETIN

Office of Publication:
DELAWARE AND HUDSON BUILDING,
ALBANY, N. Y.

PUBLISHED semi-monthly by The Delaware and Hudson Company, for the information of the men who operate the railroad, in the belief that mutual understanding of the problems we all have to meet will help us to solve them for our mutual welfare.

Permission is given to reprint, with credit, in part or in full, any article appearing in THE BULLETIN.

Vol. 9 | August 15, 1929 | No. 16

When History Was Made

ONE hundred years ago (in January) the first railway locomotive to reach this country arrived at the port of New York. This pioneer locomotive, fittingly named the *America*, was built by George Stephenson at Newcastle, England, for the Delaware & Hudson Company. A cylinder of this historic locomotive is still preserved in the Smithsonian Institution in Washington, D. C.

Four
engines

America

Horatio Allen, an agent of the Delaware & Hudson Company, went to England in 1828 to procure four locomotives to operate on a sixteen-mile gravity tramway between Carbondale and Honesdale, in northeastern Pennsylvania. Allen ordered one locomotive, the *America*, from Stephenson, builder and operator of the *Locomotion*, the first successful locomotive to be operated on any railroad in the world. The other three locomotives, the *Stourbridge Lion*, the *Delaware* and the *Hudson*, were ordered from a firm in Stourbridge, near Birmingham, England.

The *America* was shipped across the Atlantic in the steamship *Columbia* and arrived at New York January 15, 1829. It was then taken by sloop to Rondout, and from that point it was shipped up the Delaware & Hudson Canal. The *Stourbridge Lion* arrived at New York in May, the *Delaware* in August and the *Hudson* in September. Unfortunately, no record was kept of the actual operation of any of these locomotives save the *Lion*, which made its first, and presumably its last, run between Honesdale and Carbondale on August 8, 1829. Horatio Allen had contracted for three-ton locomotives, but when the *Lion* arrived it was found to weigh seven tons. The wooden rails, thinly capped with strap-iron, were too slight to sustain the weight. It is said that "Allen demonstrated his courage if not his discretion by running the *Lion* across a trembling trestle at the rate of ten miles an hour amid deafening cheers, but none of the cheering multitude accepted his invitation to become immortal by accompanying him."

The *America*, forerunner of the sixty-odd thousand steam locomotives in use in America today, cost $2,581 in England, or about one-thirtieth the cost of the average locomotive now in use in this country.

Pure Water

A WARNING that water from brooks and streams may be dangerous to health, even though clear and cold was given by Mr. Charles R. Cox, a sanitary engineer in the State Department of Health in a health talk given from Station WGY recently.

"Many persons have the idea that water from any running stream in the country is pure and fit to drink if clear and cold because 'running water purifies itself'. There is a grain of truth in that old saying, but like some other traditions, there is a pound of falsity there also.

"If a running brook crosses a farm yard or pasture or flows near a highway it is bound to pick up human or animal pollution, which, taken into the human system may cause disease. True it is, that certain factors begin at once to render the water less dangerous but what chance has it of becoming fit to drink? Let us see. First of all, solid material tends to settle out, the heavier particles first, but the amount of sedimentation depends on the rate of flow; the faster the stream the less settling. Thus solid material may be carried long distances from the place where the stream became polluted. Moreover, disease bacteria are so light in weight that there is comparatively little chance of their settling so long as the water remains in motion. If other streams join the first stream the pollution may become greatly diluted and then much less dangerous, but on the other hand, these tributaries may be highly contaminated and so increase the danger. Oxidation of impurities by air is rapid in fast flowing streams if the water flows over rocks or falls. Sunlight also has a better chance to kill harmful bacteria if the stream is turbulent, so that fresh surfaces of water are constantly ex-

In the September 1, 1929 issue of *The Delaware and Hudson Company Bulletin,* there is a very detailed article about *(*pp. 261-263, 270) the *Stourbridge Lion* centennial celebration in 1929. Here is that article:

The Stourbridge Lion Centennial

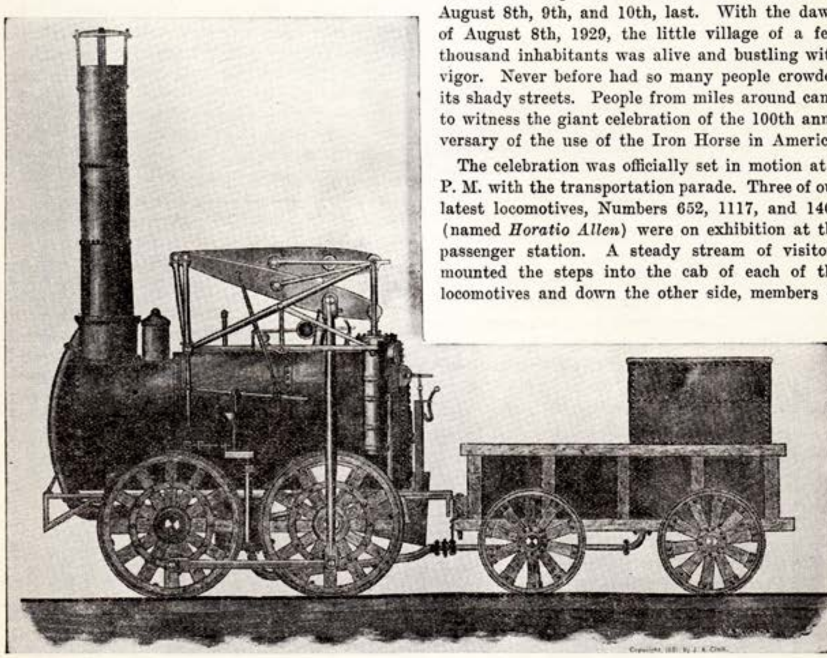
Honesdale Celebrates the One Hundredth Anniversary of the Operation by Horatio Allen of the First Locomotive to Run in America

THERE is no more interesting subject under the sun than the development of transportation, for the story of transportation holds the key to the progress of civilization. So long as man can find new and quicker modes of travel he will continue to make progress, the limit of progress will only be reached when he can move about no faster or with no greater ease. In no other field, with the possible exception of electricity, has there been more activity during the past century than in the field of transportation. It hardly seems possible that it was only one hundred years ago this year that the first locomotive to run in America, the *Stourbridge Lion,* made its famous trip from Honesdale to what is now Seelyville. The locomotive never operated in service because of its excessive weight (7 tons) but that trip opened a new era in American commerce.

After its second test trip was concluded the *Stourbridge Lion* passed into history and so far as is known it never ran again, but these trips had been sufficient. The American people realized that this was the mode of travel of the future and gradually accepted it thereafter as matter of course. Today there are 249,131 miles of railroad in the United States.

To commemorate the one hundredth anniversary of that eventful trip and the birth of steam transportation in this country, the Stourbridge Lion Centennial Exposition was held in Honesdale August 8th, 9th, and 10th, last. With the dawn of August 8th, 1929, the little village of a few thousand inhabitants was alive and bustling with vigor. Never before had so many people crowded its shady streets. People from miles around came to witness the giant celebration of the 100th anniversary of the use of the Iron Horse in America.

The celebration was officially set in motion at 2 P. M. with the transportation parade. Three of our latest locomotives, Numbers 652, 1117, and 1400 (named *Horatio Allen*) were on exhibition at the passenger station. A steady stream of visitors mounted the steps into the cab of each of the locomotives and down the other side, members of



The Stourbridge Lion

the Motive Power Department at Carbondale being on hand to see that the locomotives were exhibited to advantage. So steady was the stream of callers that the locomotives were electrically lighted on the second day so that on that and the following evening they were perfect counterparts of locomotives in actual night service on the railroad. Many of the visitors were curious to know more about the locomotives which were on display than was apparent upon casual inspection. Particular interest was shown in our new 652 and many men and women were heard to express the opinion that it was the neatest appearing locomotive they had ever seen.

The transportation parade proved to be a most interesting study in various modes of travel from old ox-carts to the modern passenger-carrying biplane. The parade was led by automobiles carrying the heads of the exposition and their guests including COLONEL J. T. LOREE, Vice-President and General Manager; W. W. BATES, Assistant to General Manager for Personnel; GEORGE E. BATES, Assistant to Vice-President for Industrial Development; H. F. BURCH, Assistant General Manager; H. S. CLARKE, Engineer, Maintenance of Way; G. S. EDMONDS, Superintendent of Motive Power; and C. A. MORGAN, Superintendent of the Pennsylvania Division.

Descriptive floats and elaborately costumed paraders followed. A tribe of Indians with their crude travois carrying their belongings, painted and dressed in their trappings of war, typified the first method of transportation. There were old fashioned stage coaches, high-wheel bicycles, old fashioned baby carriages, motorcycles, and automobiles. The group of automobiles included machines from the first ones manufactured to the present day, one-cylinder machines steered with a bar instead of a wheel up to the modern eight and twelve cylinder limousines. And, as a token of what the future holds in store for transportation development, a two-seated biplane moved up and down the street under its own power. Over head another plane roared about the city.

At 3:30 P. M. a monument was dedicated by Mrs. R. D. Lewis, granddaughter of Horatio Allen, on approximately the spot where the *Stourbridge Lion* began its famous trip over the none too strong right of way. Upon it is this inscription: "Near this site on August 8th, 1829, the *Stourbridge Lion* made its trial trip on the railroad of The Delaware and Hudson Canal Company with Horatio Allen as engineer. To commemorate that historic event this monument was erected by the citizens of Honesdale, Pennsylvania, August 8th, 1929."

Immediately following the dedication L. A. Howell, Chairman of the Committee, opened the speaking of the afternoon. He was followed by the Honorable A. T. Searle, President Judge of Wayne County; COLONEL J. T. LOREE, Vice-President and General Manager or our company; the Honorable Samuel E. Shull, President Judge of Pike and Monroe counties; and the Honorable Harry A. Mackey, Mayor of Philadelphia. Between the various speeches music was furnished by the Lawrence Band.

Following a band concert at Central park the historical pageant was held in the evening on the Stourbridge Lion School Grounds. The pageant opened with four groups dressed in the native costumes of England, Ireland, Scotland, and Germany, coming from the four corners of the field singing national folk songs. They gathered on the stage and sang *America* while moving slowly from the center stage to the choir stage. The orchestra picked up *Meditation* and The Weaver, the main character in the pageant, crossed the field and took his place on the stage.

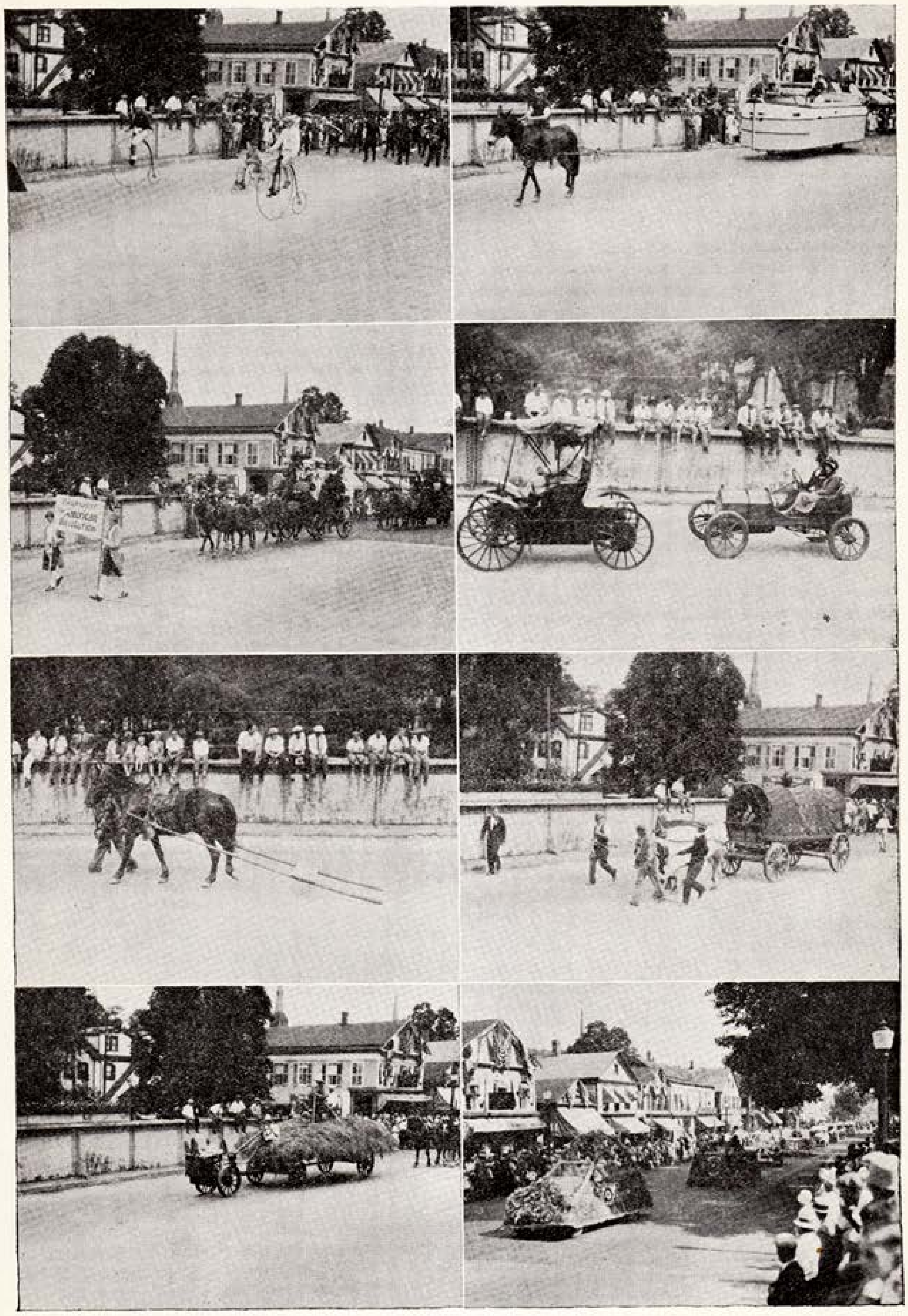
The theme of the pageant centered around the weaver "who weaves the web of the years." Supporting him were actors representing Fortitude, Courage, Industry, Friendship, Faith, Equality, Progress, Good-Will, Service, War, Lamentation, and Peace. The story runs from the pioneers who first opened the territory, the coming of the railroad, the Civil War, and the peace which followed. The pageant which was one of the most colorful and well presented of its kind in eastern Pennsylvania for some years was written and presented under the direction of Rev. William R. Newton who also took the part of The Weaver.

On the second day there was a very interesting parade of the local industries and business houses, all of which entered floats. In mid-afternoon an airplane circled overhead, climbing up to such a height that it was a mere speck in the sky. The pilot then began to put it through various stunts, loops, turns, upside-down flying, and steep climbs and dives. After several minutes of stunting he came down to earth again in long graceful glides.

A tent on Main Street contained a very interesting exhibit in the form of a perfect working model, built to scale, of the Loree Breaker at Plymouth, Pa. This breaker has a capacity of 8,000 tons in eight hours.

The third and final day of the celebration was devoted to a parade of the fire departments of Honesdale, Carbondale, Scranton, and other near-

(Turn to page 270)



Stourbridge Lion Centennial

(Continued from page 262)

by towns and cities. This, too, was planned and executed with the same exact precision that the others were. Thousands who had witnessed the parades and speech making of the first two days also remained to see the end of the celebration.

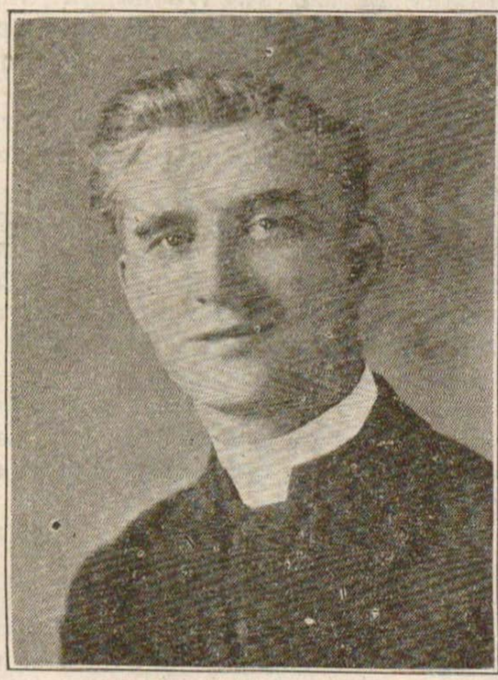
From start to finish the parades, pageant, and exhibits were presented in an orderly and picturesque manner. Those who were responsible for the exposition may be proud of their work and rest assured that it will long be appreciated by all who were present at the celebration. It might be said, further, that few towns of the same size have ever realized the brilliant success in such an undertaking that was enjoyed by Honesdale on the occasion of the Stourbridge Lion Centennial.

The following commentary on the Historical Pageant that took place in 1929 in Honesdale was published on page 2 of *The Wayne County Citizen* of August 3, 1929:

"THE HISTORICAL PAGEANT / Great plans have been made to produce a splendid pageant. Both Miss Marie Freund, the director, and Rev. W. K. Norton, the author, have worked night and day for the past several weeks with dozens of willing assistants and hundreds of actors to portray the 'Loom of the Years,' or in other words the progress of the past 100 years. / Their plans are now ready for production. The dramatization of the events of the past century will take place three evenings on the Stourbridge Field, an excellent location,--the very spot traversed by the first locomotive that ever ran in America. Could Horatio Allen's spirit look down on the transformation, his soul would be inspired with the spectacle that will be presented. / Every resident of Honesdale should see this great pageant and if possible every one in Wayne County. To miss it is to miss the real treat of the entire Centennial Celebration, to miss it is to miss a wonderful object lesson in progress, for few, if any will be alive who are here today, to celebrate the 200th anniversary. We, therefore, urge all to see this magnificent production given on a mammoth scale on the beautiful lawns of the Stourbridge Field."

Photographs of the Rev. W. K. Newton (author of the pageant), Miss Marie Freund (director of the pageant), Lewis A. Howell (Chairman of the Centennial Celebration), and Mrs. R. D. Lewis (granddaughter of Horatio Allen) are also presented in *The Wayne County Citizen*, as follows:

AUTHOR



Rev. W. K. Newton, in collaboration with Miss Freund, is the author of the libretto which will be dramatized by the pageant to be given on the Stourbridge Field.

Rev. W. K. Newton

DIRECTOR

Miss Marie Freund is the director of the pageant. She is ably assisted by others, who together have charge of several hundred actors and cast of characters.

Miss Marie Freund

LEWIS A. HOWELL

Lewis A. Howell, Chairman of the General Committee of the Stourbridge Centennial Celebration, has been a most enthusiastic and efficient manager of the various committees, who have been working to make the event a notable one. Under the capable direction of Chairman Howell the committees have worked in unison to the end that the three-day celebraton shall be a memorable one and that the various events shall move off as planned. The chairman has had the loyal support of hundreds of committeemen and women, and both he and his workers deserve great credit for the success of this great national event which is assured.

Lewis A. Howell

Mrs. R. D. Lewis

Here is the editorial by Irving Sidney Dix, the editor and manager of the *Wayne County Citizen*, that was published in that newspaper on August 3, 1929:

"HONESDALE'S GREAT CENTENNIAL EVENT. / The celebration of the beginning of rapid transportation in America at Honesdale August 8th, 9th, and 10, 1929, is a significant event of national and international importance. The running of the Stourbridge Lion Engine over the wood and iron tracks between Honesdale and Seelyville in 1829 opened up a new epoch—it showed the possibilities of the steam locomotive, and while this initial trial was not immediately followed up by successful operation of railroad transportation in Wayne County, it indicated to other pioneer adventurers working on the same proposition that such means of locomotion was possible if a proper track was constructed. / At the time Horatio Allen, America's first engineer, pulled the throttle on his little locomotive at Honesdale, there were only some twenty-five miles of railroad in America, these twenty-five being used on gravity roads, where stationary engines pulled the loaded cars up the inclines, and allowed them to run by gravity down the declines. Thus the change that has been wrought in the past century in transportation is marvelous. The first engine made ten or twelve miles an hour; an engine today could made sixty-five and seventy miles as easily as the Lion made its ten, and the automobile has been driven over two hundred miles an hour, not to mention the speed of the airplane. That we shall see as great an advance in speed during the coming century is probable but seems hardly possible. / With these thoughts in mind the people of Honesdale have planned a great celebration to worthily commemorate this remarkable epoch. A splendid monument has been erected to the memory of thee first engineer, Horatio Allen, and the locomotive he operated; great parades will be in progress for three days, typifying the progress of the century; excellent addresses will be made by prominent speakers; officials of America's great railway systems will be present, and every evening during the centennial a wonderful pageant illustrating the progress of the County of Wayne, and the town of Honesdale, which is the progress of America, will be dramatized under the splendor of marvelous electrical illumination. It will be a worthy commemoration of the progress of all the peoples of the great western continents, and the citizens of our town, our country, our state and our nation, and the whole world, may well be proud of our determination not to let pass by so eventful an occasion without calling to the minds and hearts of the civilized inhabitants of all the world the marvelous progress of the past century of 1829-19029. / Honesdale, Pa., August 1, 1929. IRVING S. DIX."

In the August 3, 1929 issue of *The Wayne Independent*, the "Centennial News and Information" that is reported below was published:

Centennial News and Information

The Stourbridge school lavatories, rest rooms, etc. will be open each evening, and the Stourbridge ground or park will be available to all visitors during the day. The committee appreciates very much the action of the school board and Mr. Koehler in cooperating so nicely, and the use of the schools will be a wonderful help.

The Red Cross will have a first aid station at their office on Main street and also on the Pageant grounds in charge of capable nurses.

The D. & H. Railroad Co. advised the committee that they are sending three of their most modern engines, so that our visitors and townspeople can see the very latest designs in engine building.

Just what will please! Five beautiful new post cards, in a packet, can be had as a remembrance of the Stourbridge Centennial, sold by Honesdale Improvement society and young ladies will have same for visitors, 25 cents. The society will receive any profits.

The Librettos for the pageant will be sold by the Girl Scouts at 25c each, in advance of the pageant. Reading one of these will help you to enjoy the pageant more fully.

On Monday evening no one except those taking part in the pageant will be admitted to the grounds at the Stourbridge field. The public is kindly asked to refrain from any plans to use the Stourbridge grounds on this evening.

The reserved seats for the Pageant will be on sale at the banks in Honesdale, commencing Saturday morning.

Word has just been received that Col. Loree, vice president and manager of the D. & H. railroad, will be present on transportation day and make an address at the unveiling of the monument. Col. Loree has been of considerable assistance in helping to make the celebration a success.

The Band Concert and Public Reception each afternoon will be in Central Park. The band will be stationed in front of the court house and the whole park will be available to those desiring to attend.

The Lyric theatre will show a special film next week of the B. & O. Pageant, held in Baltimore a year or so ago. This will give you some idea of what you may expect to see at the Honesdale pageant.

The Committee in charge has been advised that three different moving picture concerns will be present during the celebration, and that the films will be used all over their respective circuits.

The Honesdale Improvement society is alert to the needs of the day. They have recently overhauled the ladies rest room in the court house at considerable expense. Two new lavatories have been added, pins and needles and thread and other conveniences will be found there for guests. Do not forget this comfortable quarter when you visit the county seat, Centennial week.

Since the last announcement there has been a change in the arrangement of tickets for the pageant. The committee have found it necessary to reserve the entire grandstand and sell the tickets at $1 each. A large number of unreserved seats will be available at 50 cents each, and after these are sold standing room only will be available at 50 cents. Owing to the great demand for reserved seats the committee have concluded that it would be wise to reserve the entire grandstand.

Girl Scouts will make a house to house canvass, starting Thursday afternoon, with Librettos of Pageant. It is hoped they will receive courteous treatment and that all will buy. Girls will receive a small commission to be used to aid their work.

Here are two photograph of the Horatio Allen in Honesdale in 1929 for the centennial celebrations of the initial run of the *Stourbridge Lion* in 1829. Both of these extremely rare photographs are in the collections of the Carbondale D&H Transportation Museum:

D&H No. 1400, Horatio Allen

D&H No. 1400, Horatio Allen, in Honesdale, PA, August 8, 1929.

D&H No. 1400, *Horatio Allen*

D&H No. 1400, Horatio Allen, in Honesdale, PA, August 8, 1929.

At the *Stourbridge Lion* centennial celebrations in Honesdale, commemorative brass *Stourbridge Lion* tickets (2 ½” x 4”) were sold. At the train show held in the Radisson Lackawanna Station, Scranton, on March 5, 2017, Pat Toban, Scranton, showed the author one of these heavy brass tickets, which he plans to give to the Wayne County Historical Society. “These tickets gave the purchaser access to all of the commemorative events in Honesdale at the time,” said Toban.

More on the 1929 *Stourbridge Lion* centennial celebration is presented in the Winter 2004 issue of the *Newsletter of the Wayne County Historical Society*, as follows:

newsletter

WAYNE COUNTY HISTORICAL SOCIETY

Winter 2004

Volume 19 • Number 1

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1929 Lion Centennial a Spectacular 3-Day Event in Honesdale

Borough Hosted Parades, Music, Pageantry, 30,000 Onlookers

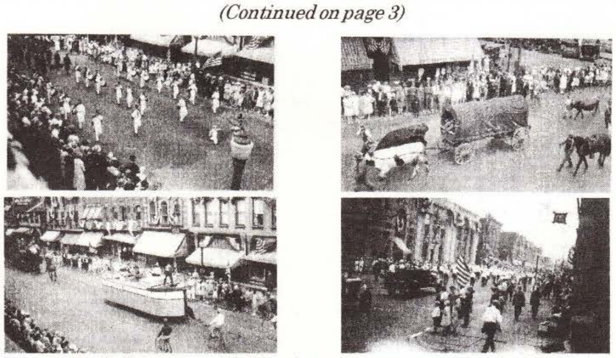
By Ann O'Hara

Considerable excitement was generated on August 8, 1829, when Horatio Allen drove the Stourbridge Lion from Honesdale to Seelyville and back. Visitors and townspeople applauded Allen's bravery and the Lion's speed and power. The test runs, however, were deemed a failure and the Lion never ran on the Delaware & Hudson Canal Co. Gravity Railroad.

While the Lion was never entirely forgotten, through all the years of operation of the canal and gravity railroad it remained a historical curiosity. Local newspapers ran occasional articles, and the Lion made the history books, but the thought of celebrating the anniversary of the run appears never to have come up. In 1929, though, the borough fathers put together the celebration to end all celebrations—a centennial that will be hard to match in 2029!

The *Wayne Independent* of August 8, 1929, the opening day of the Centennial, reported that "Honesdale's citizens have cooperated splendidly in every detail, giving generously

(Continued on page 3)



Bands, floats, animals, flags, bunting, street crowds mark 1929 Stourbridge Lion Centennial parade

Brown Optimistic Lion Will 'Operate,' but Will It Run?

Whether the 175th anniversary of the first run of the Stourbridge Lion in 1829 will actually see the replica come to life and roar down makeshift tracks propelled by steam belching from its coal-fired furnace remains an uncertainty at press time. But project leader Rod Brown and his staff continue optimistic as, one by one, obstacles are cleared.

Even if the Lion replica fails to move, far-reaching plans are underway to make the 175th anniversary a memorable celebration in Honesdale. Among events contemplated are a train excursion, entertainment, a symposium and others to be announced. Watch for details.

CAPITAL CAMPAIGN 2005 UPDATE

Pledges and donations as of December 31, 2003

\$379,339

If you haven't returned your check or pledge card, please consider doing so..

1929 Lion Centennial . . .

(Continued from page 1)

of their money, offering unstintedly their talents and energies, working over time preparing floats and features, and this journal extends congratulations to the management in charge and to all those who have so willingly contributed to make it a success."

Local merchants joined in with gusto. Butler Brothers Jewelers offered a Stourbridge Lion Centennial Sterling Silver Teaspoon. The Menner Co. had a special sale of bathing suits for Centennial Week (although no aquatic events were on the program), and the Irving Cut Glass Co. suggested that visitors pick up a souvenir of Honesdale from among its variety of gold decorated engraved and etched glassware. The Honesdale Memorial Works chimed in with a timely reminder to former residents attending the event: "LEST WE FORGET. During your visit to Honesdale Centennial it might be well to give a few minutes thought to the graves of relatives who are resting in our cemeteries without proper marking."

An airplane on a truck participated in the parade but was upstaged on Friday by a Navy dirigible flown in from Lakehurst, N.J.

Local homeowners rented out rooms through the Chamber of Commerce, and businesses were asked to close during the parades. Rest rooms were made available at the Central High School, Stourbridge School, D&H passenger station, all hotels and banks and most of the stores. The Honesdale Improvement Society paid for an overhaul of the ladies' room in the courthouse. The Lambert Silk Mill grounds and the former D&H roundhouse were made available for parking, and Honesdale residents were asked not to use their cars. The committee asked all out-of-town visitors to register at the Chamber of Commerce and warned that pickpockets and "short change men" were apt to be working the crowds. The Red Cross maintained first-aid stations on Main Street and on the pageant grounds.

The great event took place over a three-day period—August 8, 9 and 10—and the schedule reveals an amount of planning and coordination that would be next to impossible to duplicate today. There was a parade on each of the three days – a Transportation Parade, a Civic Parade and a Firemen's Parade, each of which featured floats, marching bands and vehicles.

The festivities opened at 2 p.m. on Thursday, August 8, with the Transportation Parade, depicting various modes of transportation over the years, with examples or re-creations of the "tallyho," oxcart, wood burning locomotive, baby carriages, trucks, tractors, horse drawn vehicles, automobiles, bicycles and a canal boat. The parade was led by three state highway patrolmen on motorcycles, followed by local police and the mayor and borough council in automobiles. An "array of Indians" (including two ladies) on horseback thrilled the crowd, and a troupe of frontiersmen preceding a covered wagon drawn by oxen followed them.

An airplane on a truck participated in the parade but was upstaged on Friday by a Navy dirigible flown in from Lakehurst, NJ, and by Lake Ariel Amusement Park owner Floyd C. Bortree, who made airplane flights over Honesdale on all three days.

At 3:30 in Central Park Lewis A. Howell, chairman of the Centennial Committee, opened the program, thanking the D&H Railroad, the Chamber of Commerce and Business Men's Association, School Board and other civic societies and introducing the day's chairman, Hon. A. T. Searle, President Judge of Wayne County.

The new Stourbridge Lion Monument was unveiled by Mrs. R. D. Lewis, granddaughter of Horatio Allen. Col. J. T. Loree, Vice President of the D&H Railroad Co., then addressed the crowd, followed by the main speaker, Harry A. Mackey, Mayor of Philadelphia. (The *Independent* reported, "It was hinted that he is a Baptist, but he exhorts more like a Methodist.") The Lawrence Band had the honor of providing music for the first day's program.

A free band concert and public reception followed the parade each day in Central Park, and in the evening revelers were invited to a ball at the Armory sponsored by the General Centennial Committee or to a street carnival in town.

The Firemen's Parade on Saturday featured representatives from more than twenty-five municipalities and of course the usual marching bands. The Mitchell Hose Company of Carbondale capped the parade when they engaged in a brawl on Saturday night, the brouhaha occasioned by a controversy over who would lead their delegation.

The *pièce de résistance* of the three-day event was a spectacular pageant with a cast of over 500, presented all three nights to sellout crowds. A grandstand with a capacity of 1,500 was built south of the school building and the pageant unfolded on the Stourbridge Field, near the site of the first run. Entitled "The Loom of Years," the pageant depicted five episodes in the history of Honesdale. it was cowritten and codirected by Rev. W. K. Newton of the Presbyterian Church and Miss Marie Freund, with Miss Jessica Robinson responsible for the music.

Parades, concerts, the pageant, parking and restrooms—all came off without a hitch. The weather cooperated, the schedule was maintained and everyone had a great time. The 150th anniversary in 1979 was a humdinger and the upcoming 175th Anniversary Committee hopes to equal it in 2004. But to match the big Centennial, the whole community had better start planning now for 2029.

Do we have any volunteers? □

45. D&H Executive Department, 1930:

Who were the members of the Executive Department of the Delaware and Hudson Company at the time of the *Stourbridge Lion* Centennial celebrations? The following list is given on page 1 of *The Delaware and Hudson Company Official List No. 50*, January 1, 1930:

THE DELAWARE AND HUDSON COMPANY

EXECUTIVE OFFICE

32 Nassau Street, New York, N. Y.

GENERAL OFFICE

The Delaware and Hudson Company Building, Albany, N. Y.

EXECUTIVE DEPARTMENT

L. F. Loree	President and Chairman of Executive Committee	New York, N. Y.
J. T. Loree	Vice-President and General Manager	Albany, N. Y.
F. W. Leamy	Vice-President	New York, N. Y.
F. P. Gutelius	Resident Vice-President	Montreal, P. Q.
H. M. Irwin	Assistant to President	New York, N. Y.
E. St. J. Greble, Jr.	Assistant to President	New York, N. Y.
R. C. Kann	Assistant to Vice-President	New York, N. Y.
W. H. Davies	Treasurer	New York, N. Y.
J. W. Coon	Secretary	New York, N. Y.
H. L. Petersen	Assistant Secretary	New York, N. Y.

46. May 1, 1933:

Century of Progress Exposition

In 1933, a replica of the *Stourbridge Lion* was sent to Chicago's "Century of Progress" Exposition. The following article, titled "*Stourbridge Lion* Runs Again," was published in the May 1, 1933 issue of The *Delaware and Hudson Railroad Bulletin*, May 1, 1933, pp. 75-76. Here is that article:

"Stourbridge Lion" Runs Again

In Replica Built for Chicago's "Century of Progress" Exposition

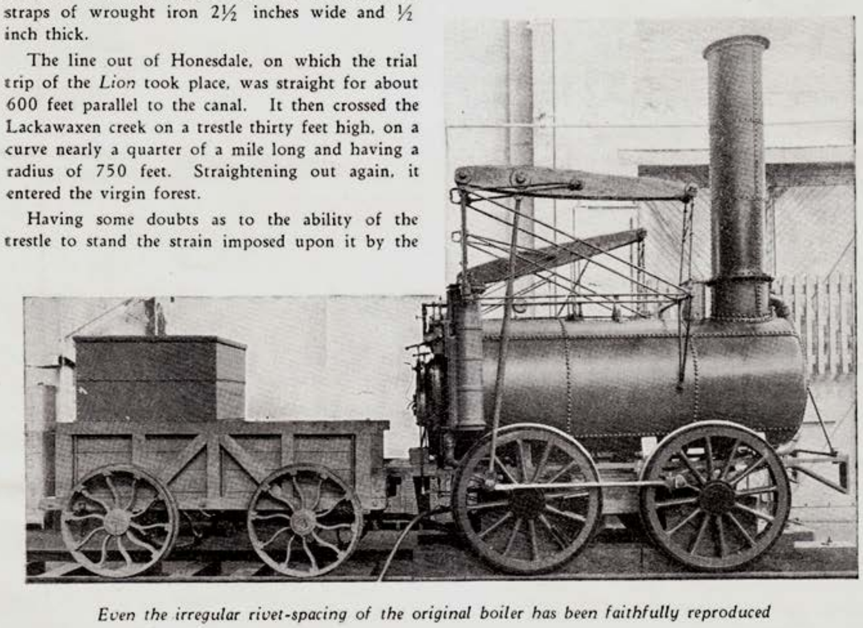
THE Century of Progress, for which the 1933 Chicago Exposition has been named, takes in the entire history of American railroading with but very little extension of its hundred-year span. Likewise it includes the period of steam locomotive operation in the Western Hemisphere, from the day when the Delaware and Hudson's *Stourbridge Lion* made its epochal trip as the first locomotive to operate on an American railroad, to the completion of the *L. F. Loree*, the world's most modern prime mover, for the same company.

Built by Foster, Rastrick and Company of Stourbridge, England, as one of a lot of locomotives ordered by this company in 1828 for operation on its new line from the anthracite fields of northeastern Pennsylvania to the canal terminus at Honesdale, Pa., the *Lion* made its first trip August 8th, 1829. Although the specifications called for a weight of 5 tons, the completed machine was found to weigh nearly 8 tons, too much for the soft hemlock stringers which served as rails to bear, although the running surface was protected by straps of wrought iron 2½ inches wide and ½ inch thick.

The line out of Honesdale, on which the trial trip of the *Lion* took place, was straight for about 600 feet parallel to the canal. It then crossed the Lackawaxen creek on a trestle thirty feet high, on a curve nearly a quarter of a mile long and having a radius of 750 feet. Straightening out again, it entered the virgin forest.

Having some doubts as to the ability of the trestle to stand the strain imposed upon it by the passage of the locomotive, Horatio Allen, who had supervised the construction and erection of the *Lion* both in England and in this country, insisted that he alone would risk the danger. With the rash courage of a man of but 27 years, Allen pulled the throttle wide open and the locomotive moved out onto the quaking trestle, rounded the curve in safety, and disappeared from view in the forest. About a mile further, at Seeleyville, a highway bridge across the line was too low to permit the passage of the *Lion's* tall smoke stack, so she retraced her "steps" and returned to Honesdale without incident.

Subsequent attempts to strengthen the track structure by the addition of hardwood strips on top of the hemlock stringer-rails failed to make it stout enough for locomotive operation, and, after a second trial on September 9th, the *Lion* was removed from the rails and stored alongside the track, a rude covering of boards protecting it but slightly from the weather. In 1849 it was moved to the



Even the irregular rivet-spacing of the original boiler has been faithfully reproduced

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company's shops at Carbondale. Here the boiler was put to use, and many of the other parts were adapted to other purposes. Twenty years later the boiler was superseded by one of higher power and sold for junk. Fortunately it was located in the foundry yard of Lindsay and Earl and that firm deposited it with the Smithsonian Institute in Washington, June 18, 1889. A number of other parts of the *Stourbridge Lion* have also been collected there and the locomotive has been partially reconstructed.

As a part of the Delaware and Hudson exhibit at the Chicago Century of Progress Exposition, a replica of the *Stourbridge Lion* has been built at the company's Colonie Locomotive Shops.

Drawings for the replica were prepared from data taken from blueprints of the *Agenoria*, sister locomotive of the *Stourbridge Lion*, built by the same builder in the same year, and obtained from Kensington Museum in London, as well as from a drawing of the original locomotive made under the direction of Professor Renwick of Columbia College (now University) in 1829. These, together with the actual boiler, cylinder and walking-beam now in the Smithsonian Institution in Washington, D. C., made it possible to prepare a design from which the shop forces could build the counterpart of the original locomotive.

The boiler is of the "internally fired" type, the furnace being entirely surrounded by water. The firebox is circular, about 29 inches diameter and 4 feet long. The gases are conducted to the front end of the boiler through two circular flues which are joined at the front under the stack. Ashes are removed through the fire door and conveyed to a flattened funnel, projecting downward thru the deck to drop the ashes between the rails. The locomotive is designed to burn anthracite.

The cylinders are mounted vertically at the rear of the boiler at either side. Pistons, with a 36-inch stroke, connect at their upper ends with a horizontal walking beam, no point of which is fixed in position, its forward end being attached to a vertical swinging link, so that its path of motion is quite complicated. The main driving rods are hung vertically from a point one-quarter of the way in from the rear end of the walking beams. Consequently, the *Lion* in operation resembles a gigantic grasshopper.

The driving wheels have cast iron hubs and wood spokes, except those to which the crank pins are applied, these being of iron. The fellies are also of wood. A wrought iron retaining band is shrunk on over the fellies, holding the wheel firmly together and over this is finally shrunk the wrought iron tire, having a width of 4" and being ¾" thick at the tread.

What was probably the first feed water heater in America is the tightly covered wooden box beneath the boiler and surrounding the junction of the two exhaust pipes from the cylinders with the single exhaust pipe leading to the stack. On the original, this was improvised by Horatio Allen while the locomotive was being prepared for the trial run. Cold water, conveyed from the tender thru a leather pipe, enters this box at the bottom and entirely surrounds the heated exhaust pipes. Water is then pumped from the heater to the boiler, the pump being actuated by a rod connected to a walking beam.

The boiler is equipped with two safety valves, one of the lever and weight type, the other within the casing directly in back of the stack; the reason for the latter being to provide a safety valve which could not be tampered with by the engineman.

One noticeable difference between the *Stourbridge Lion* and the modern locomotive becomes apparent when it is necessary to reverse the direction of motion. Two separate reversing devices are provided, one for the right valve and one for the left.

Built to the 4 foot 3 inch gauge of the Gravity Railroad, the *Lion* cannot operate on standard gauge track.

In building the replica all iron parts have been hand forged to duplicate the workmanship of the original and the same care has been exercised with respect to all the detail parts used in the construction in order that a true replica might obtain. In the new work, for example, the rivets have been made to accord with those of the actual boiler in the Smithsonian Institution, some of them being slightly out of line, with heads of irregular size due to hand forging.

The tender likewise has been finished to correspond with that of the regular Gravity Railroad car which was taken from service for the trial trip. The wheels of this car are of interest as they are made by casting wrought iron spokes in cast iron hubs and rims, the spokes being slightly curved to allow for contraction in cooling.

The Scotchman Won

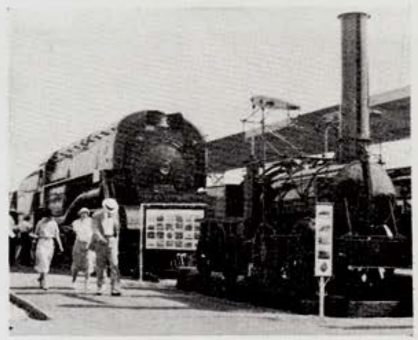
In the smokeroom of the sleeping car the Scot had been boring everyone with tales of the great deeds he had done.

"Well, now," said an Englishman at last, "suppose you can tell us something you can't do, and, by jove, I'll undertake to do it myself."

"Thank ye," replied the Scot, "I canna pay ma railroad fare."

In the August 1, 1933 issue of *The Delaware and Hudson Railroad Bulletin*, pp. 117-118, there is an article about the D&H exhibit at the “Century of Progress” Exposition in Chicago in 1933. Here is that article:

“the D&H” Exhibits at “A Century of Progress” Exposition



Our locomotives on display

HOW the Delaware and Hudson's *Stourbridge Lion*, first locomotive to be run on an American railroad, August 8th, 1829, came to go to the "Century of Progress" Exposition at Chicago in 1933 was told in the May issue of *The Bulletin* in an article describing the construction at Colonie Locomotive Shops of a replica of the original machine. In the same issue there was a description of the *L. F. Loree*, Delaware and Hudson Locomotive No. 1403, which also went to the exposition with the *Lion*, thus completing, as far as steam locomotive construction is concerned, not only a century of progress but, in effect, its entire history on this continent.

That the *Stourbridge Lion* had previously visited Chicago is, perhaps, news to many *Bulletin* readers, but the fact remains that, in 1893, the *Lion*, in replica, journeyed to the World's Columbian Exposition as shown in the accompanying illustration.

In addition to the locomotive exhibits, the Company also has an indoor booth, an artist's conception of which is also shown. Centering about the column in the foreground a mural painting, curving

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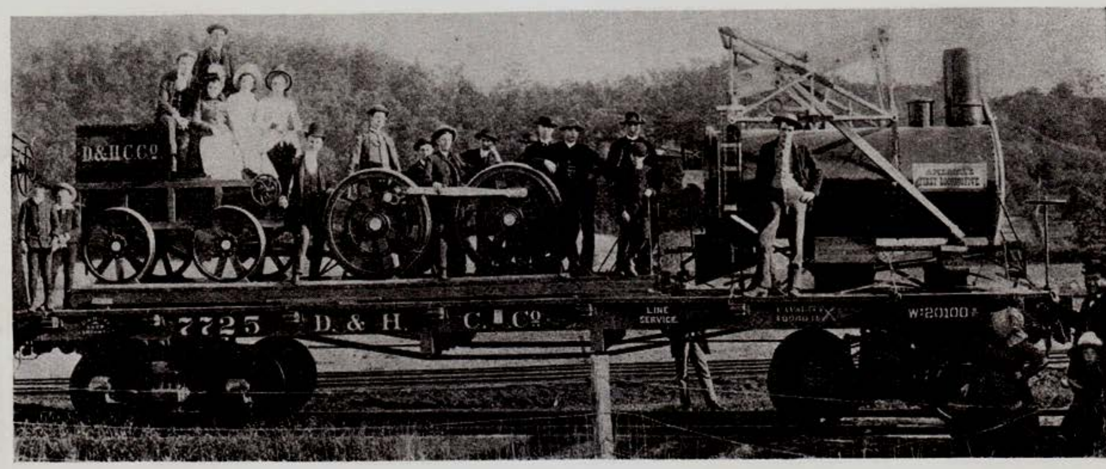
through a quarter-circle, portrays a panoramic view of the Delaware and Hudson territory from Wilkes-Barre and Binghamton to Montreal. It shows the location of the various cities, lakes, mountains and other points of interest along the lines.

Below and in front of the painting is a group of relief maps, modelled exactly to scale by members of the Engineering Department, and showing (1) the Marvine Breaker, Scranton, Pa., where Delaware and Hudson anthracite is prepared for market, (2) the Port of Albany, including the largest single-unit grain elevator in the world, (3) the Hotel Champlain and cottages at Bluff Point, N. Y., and (4) the plant of the Chateaugay Ore and Iron Company at Lyon Mountain, N. Y.

A series of photographic transparencies depicting scenes at various points in the Adirondacks, on Lakes George and Champlain, in Ausable Chasm and the Hudson and Susquehanna Valleys is used between the relief maps and the corner posts of the booth.

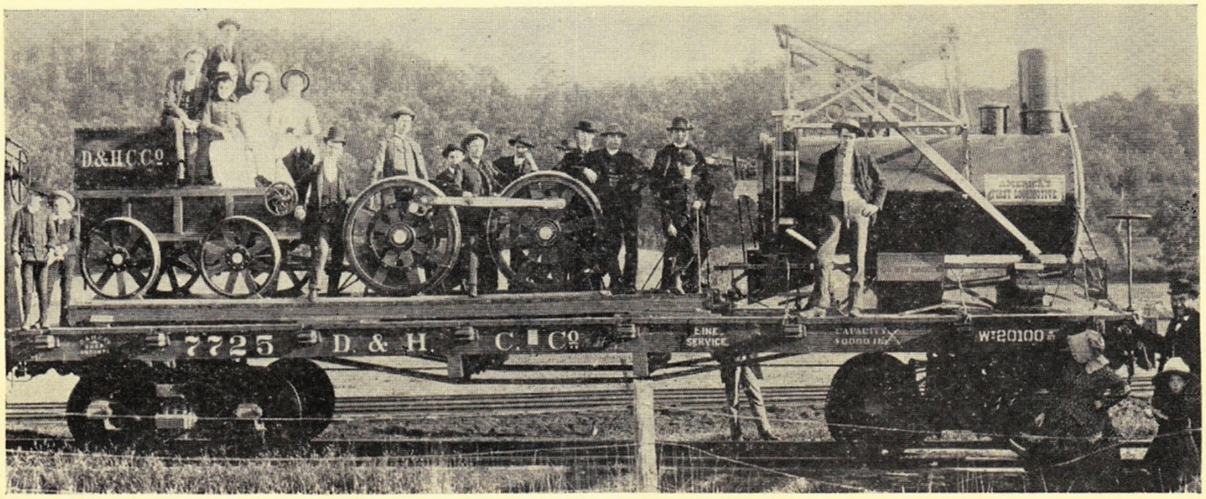
Glass cases containing specimens of the various products of the Company's subsidiaries and of the region traversed by the railroad are placed in front of and below the relief maps. The marble floor and counters, the color scheme of gunmetal, chromium and black, and a generous use of electric lights, all of which are concealed from view, produces a most pleasing effect.



"Stourbridge Lion" Chicago-bound in 1893

The same photograph that is given above of the *Stourbridge Lion* on its way to Chicago, in 1893, at Nescopeck, PA, in the Pennsylvania Railroad yards there is given in the D&H 1927 *Inspection of Lines* book:

Here is that photograph, as given in *Passenger, Freight and Work Equipment on the Delaware and Hudson The Delaware and Hudson Company BOARD OF MANAGERS INSPECTION OF LINES : :* June 2, June 5, 1927:

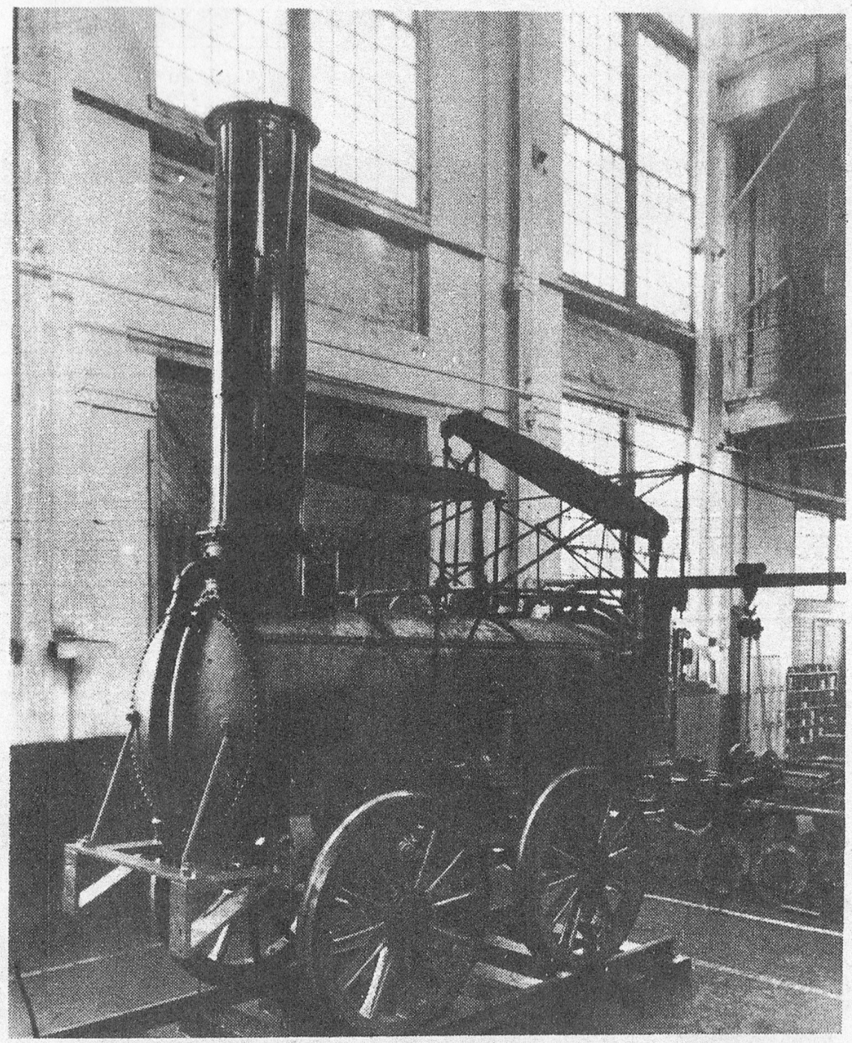


1890-1900

An interesting photograph of the "Stourbridge Lion," weight about 7,000 pounds, en route to the Columbian Exposition in Chicago, (1893), on a 40,000 pounds capacity D. & H. C. Co. flat car. This photograph was taken in the Pennsylvania Railroad yards at Nescopeck, Pa.

Fully working replica of the *Stourbridge Lion* that was made at the D&H shops at Colonie, NY in 1933 and exhibited at the Century of Progress Exposition at the 1933 World's Fair at Chicago. In constructing this replica, blueprints of the *Stourbridge Lion*'s sister locomotive, *Agenoria*, were used, as was a drawing of the original locomotive made under the direction of professor Renwick of Columbia College in 1829. This replica is now on display at the Wayne County Historical Society, Honesdale, PA. Photograph by Jim Shaughnessy, March 1973, at the D&H Shops at Colonie, NY.

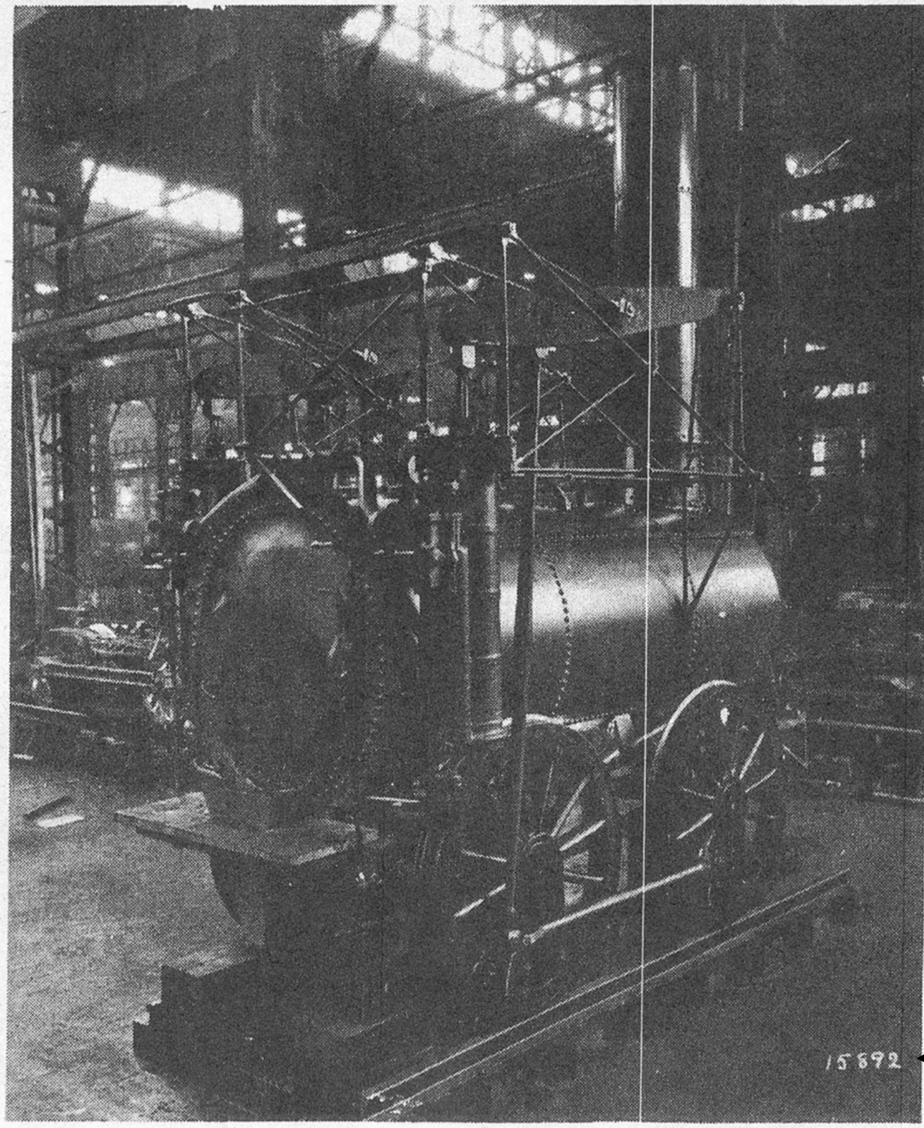
Here are two photographs of the Stourbridge Lion replica that was built at Colonie. Both of these photos were taken inside the D&H shops at Colonie. Both of these photographs were published on page 185 of the *Sullivan County Democrat,* September 13, 1979. We have never seen these two photographs reproduced anywhere else.



AN ORIGINAL PHOTO OF THE REPLICA OF THE "LION" TAKEN IN THE D&H shops at the time it was built.

One can not help but wonder about the present location of these two D&H sponsored original photographs.

ANOTHER VIEW OF THE STOURBRIDGE LION TAKEN WHEN THE replica was being built by the workshops of the D&H Canal Company in 1933. The replica was built for the Century of Progress Exhibition in Chicago.



Official D&H photographs are frequently numbered in white ink in the lower right corner of the photograph.

In an interesting commentary on the Delaware and Hudson *Facebook page* on March 31, 2015, Greg Flynn said the following about the replica of the *Stourbridge Lion:*

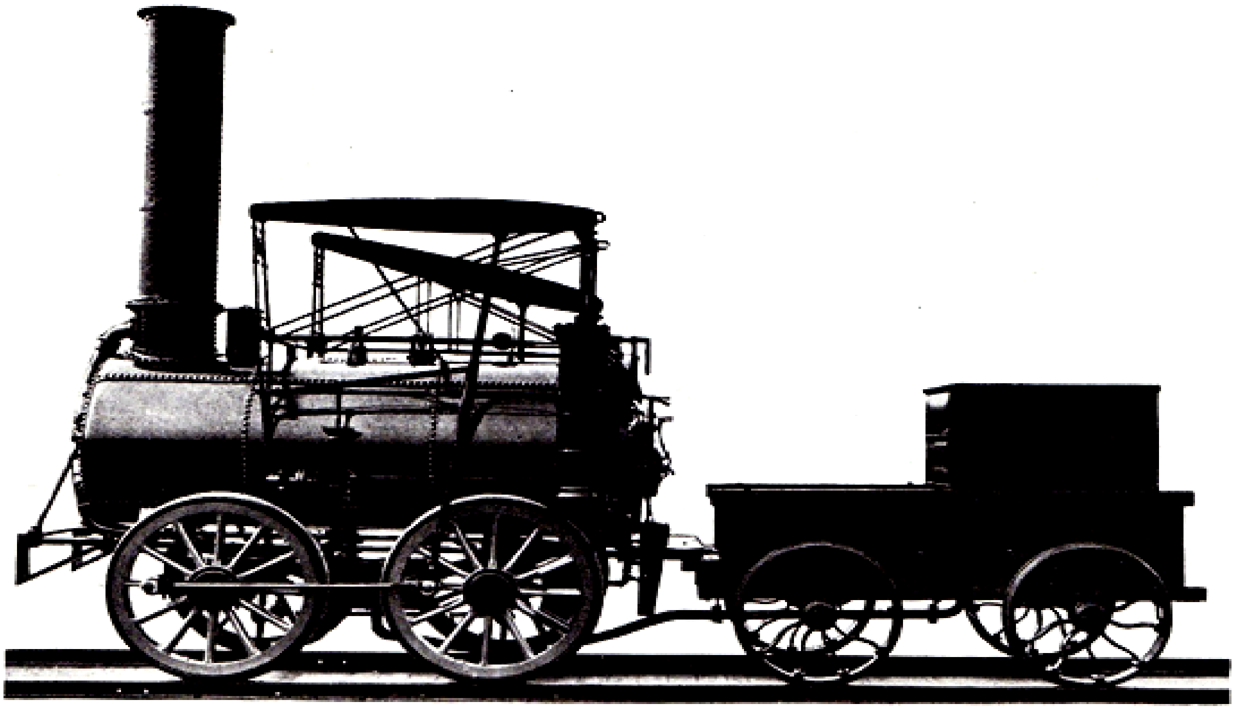
“Conventional wisdom has held for years that no D&H steam locomotives survived the diesel invasion. I never believed this was exactly the case. Witness exhibit one, the replica of the Stourbridge Lion built at Colonie. D&H President L. F. Loree was known as an iron fisted dictator whose only concern was the bottom line. Loree, however was a keen student of history, particularly that of transportation and industry. He made a decision that the D&H would participate in the Century of Progress Exposition at the 1933 World's Fair in Chicago.

At his direction, the forces at the Colonie Shop constructed this exact, fully working replica of the Stourbridge Lion, which in 1829 became the first locomotive to run on rails in the New World. While the original Lion was successful, the primitive trackage of the D&H's gravity railroad was insufficient to support her 7-ton weght, and she and her sisters faded into history unused.

The Lion replica was displayed at the exposition along with D&H experimental four cyclinder cross compound, high pressure 4-8-0 #1403, aptly named the "L. F. Loree". The 1403 had the distinction of being the only steam locootive built in 1893, and may have been the most thermally efficient and powerful eight-coupled locomotive in the world. While the 1403 and her experimental sisters would succumb to the torch during WW II scrap drives, and the D&H's final "big" steam would all be scrapped by 1954, the little Lion would spend the next 40 years in protected obscurity.

1973 would see another D&H president with a keen awareness of history, Mr. Carl B. Sterzing, Jr. It was the year of the D&H's 150th anniversary, and many events were planned to celebrate "America's Oldest Continually Operating Transportation Company". One of these events would be a speicial Sesquicentenial train which would tour the entire D&H system, and set up for public display at important points along the lines. The Lion replica was a featured attraction of the train, and probably drew more attention than the PA's from the general public. Today, the Lion happily rests in the wonderful museum of the Wayne County Historical Society, which is housed in the old headquarters building of the D&H Canal Company in Honesdale Pa. Along with the Lion, there is old Gravity coach #9, the "'Eclipse", as well as many artifacts and displays of the canal and the gravity. The musuem is a must see for any D&H fan interested in the early years of the company. Although the little engine never lugged coal over Ararat, Belden or Richmondville, or never headed up a line of Wagner Palace cars to Saratoga, a case can and should be made that the Colonie-buiilt, fully functional replica is truly the last actual surviving D&H steam locomootive in the world."

The cut and detailed text on the *Stourbridge Lion* given below are from page 97 of **Railroadians of America,** New York, Book No. 3, 1941, "Motive Power on the Delaware and Hudson":

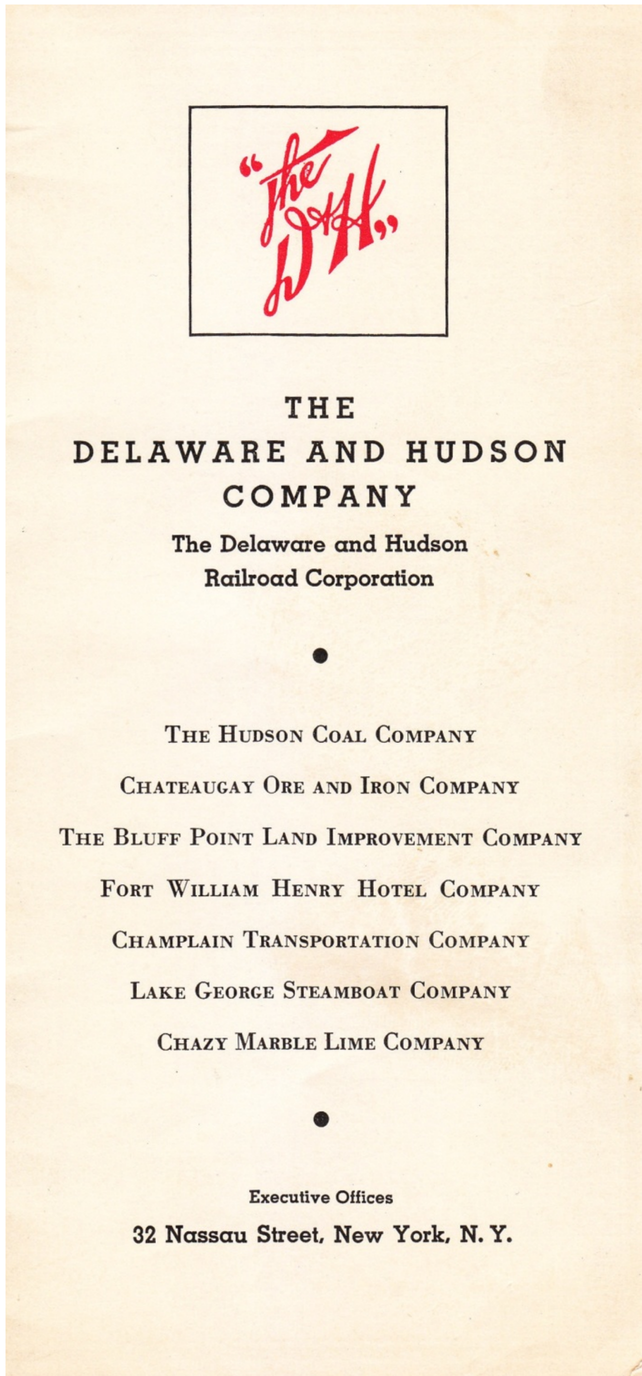


REPLICA—STOURBRIDGE LION

Built by Foster, Rastrick & Co., Stourbridge, England in 1829. (Replica built by The Delaware and Hudson Railroad Corporation at Colonie Shops, May, 1933.) Type 0-4-0. Gauge of Track 4′3″. Cylinders, Diameter 8½″. Stroke 36″. Driving Wheel Diameter 48″. Tender Wheel Diameter 36″. Boiler: Number of Courses, 3; Diameter of Middle Course, 48″; Thickness of Sheets, ½″, Length, 10′5½″, Steam Pressure 50 Pounds. Fire Box, Length 48″, Diameter, 28½″. Flues: Number of, 2; Length, 49″; Diameter, 18½″. Wheel Base, Driving 5′1″, Tender 5′0″, Engine and Tender 16′1¾″. Overall Length of Engine, 12′8½″. Overall Length of Engine and Tender, 22′2¾″. Overall height from rail, 15′0″. Stack, Diameter, 18¼″. Length of Walking Beams, 72½″. Diameter of Crank Circle, 27″. Engine Frames, Flat Wrought Iron. Grate Area, 8 sq. ft. Fuel, Anthracite. Weights: On Front Drivers, 9300 Pounds; Rear Drivers, 4700 Pounds; Total Engine, 14000 Pounds; Tender, loaded, 6300 Pounds; Total Engine and Tender, 20300 Pounds in Working Order. Heating Surface: Flues 56 square feet, Fire Box 23 square feet, Total 79 square feet. Tractive Power 825 Pounds, (Based on 30% efficiency, practice of that period). Tender Capacity, Water 400 Gallons, Coal 500 Pounds.

47. c. 1933

Given below is a one-page portrait of the *Stourbridge Lion* that was included in a flyer that was produced by the D&H, c. 1933. Given the fact that there is much very interesting data on the D&H flyer, we have presented below the entire flyer.


"the D&H"

THE
DELAWARE AND HUDSON
COMPANY

The Delaware and Hudson
Railroad Corporation

The Hudson Coal Company

Chateaugay Ore and Iron Company

The Bluff Point Land Improvement Company

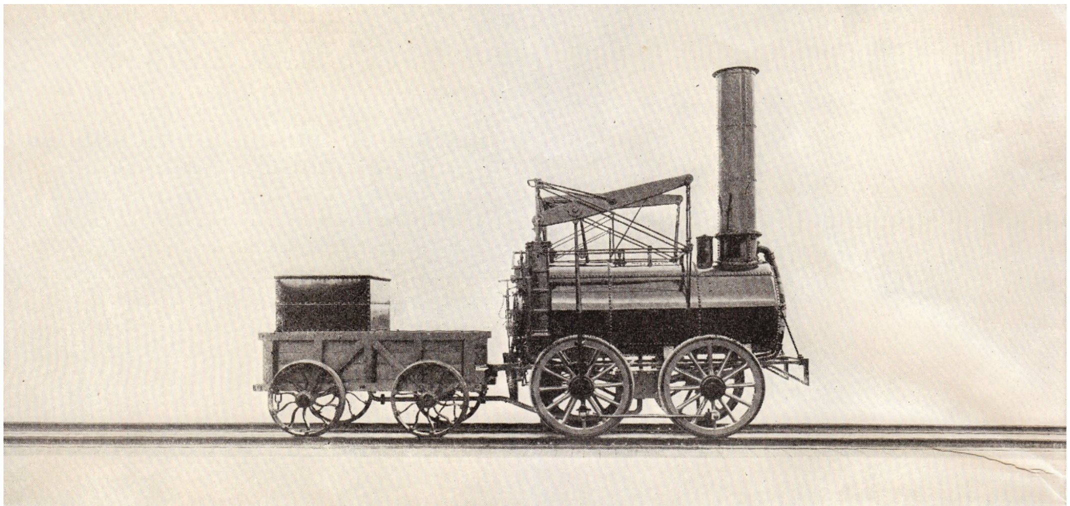
Fort William Henry Hotel Company

Champlain Transportation Company

Lake George Steamboat Company

Chazy Marble Lime Company

Executive Offices
32 Nassau Street, New York, N. Y.



THE STOURBRIDGE LION

The "STOURBRIDGE LION" was the first locomotive to run on a railway in America, and was operated between Honesdale and Seely's Mills in Pennsylvania on The Delaware and Hudson Canal Company's railroad, August 8, 1829.

LOCOMOTIVE CHARACTERISTICS

Type	0-4-0
Weight on engine truck, pounds	None
Weight on drivers, pounds	14,000
Weight of engine, pounds	14,000
Weight of tender loaded, pounds	5,800
Weight of engine and tender, pounds	19,800
Boiler pressure, pounds	50
Cylinders, two	8½″ x 36″
Drivers, diameter	48″
Tractive effort, pounds	825
Grate area, square feet	8
Valves and motion	Slide, loose eccentric
Feed water heater	Foster, Rastrick and Co.
Tank capacity	400 Gals., ¼ ton
Fuel, kind	Anthracite
Track gauge	4′ 3″

One hundred and ten years ago The Delaware and Hudson Canal Company obtained rights from the Legislature of Pennsylvania, authorizing them to construct a canal from the mouth of the Lackawaxen to the present site of Honesdale and also to construct a railroad from their coal beds at Carbondale to the head of this canal.

In January, 1828, Horatio Allen left New York for England and contracted for four locomotives, one of which, the "STOURBRIDGE LION," built by Foster, Rastrick and Company of Stourbridge, was shipped in February, 1829, unloaded in New York, May 14, and then taken to Honesdale, Pa., arriving the latter part of July, where it was placed on the track and prepared for service.

One of the Company's coal wagons was fitted up to serve as a tender and a box added under the boiler, built around the junction of the two exhaust pipes from the cylinders with the single exhaust pipe to the stack, from which water flowing from the tender was pumped into the boiler. This was probably the first feed water heater in America.

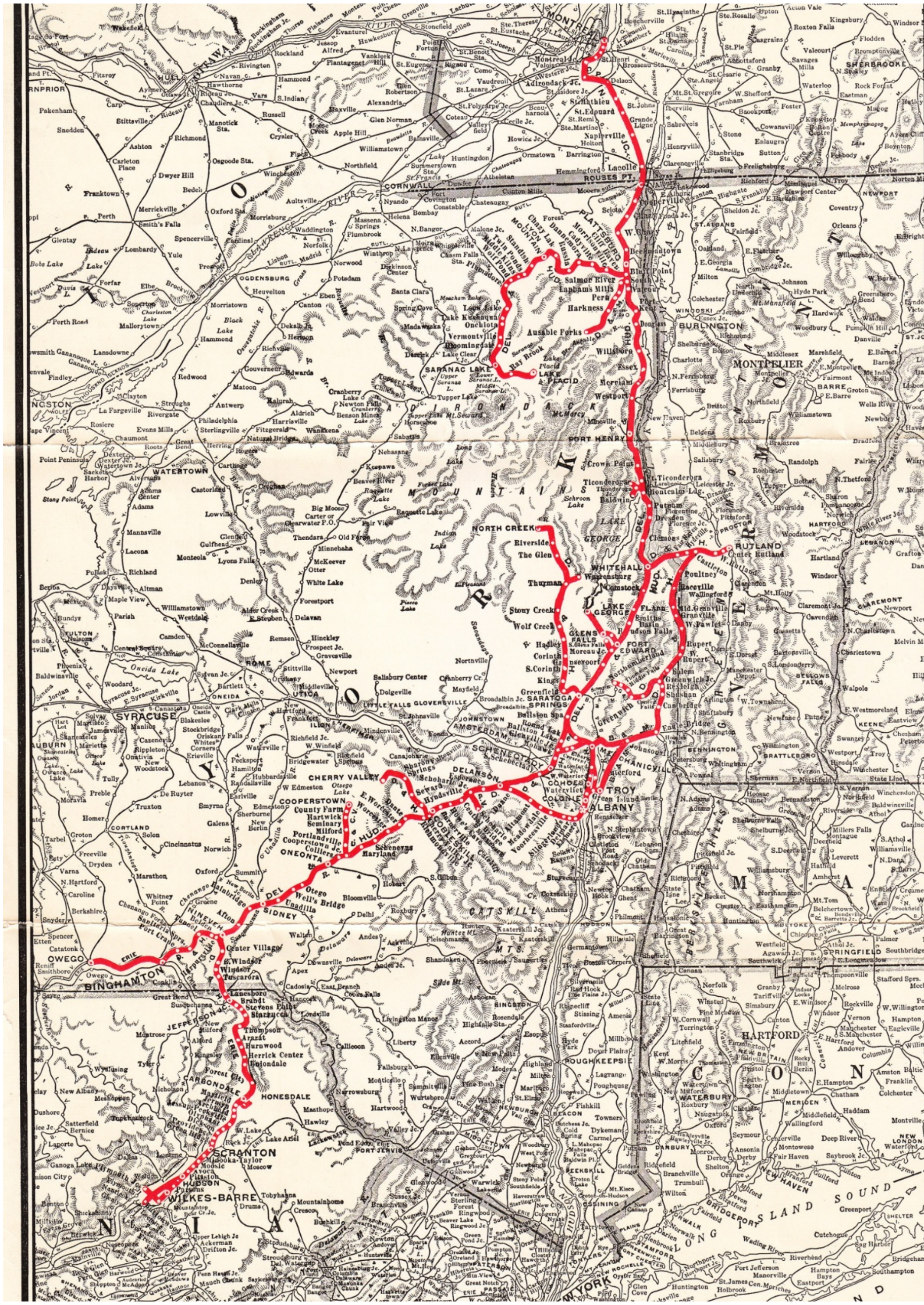
The name LION was suggested by the fancy of a workman, who painted on the circular front, the head of a fierce-looking lion in bright colors, covering nearly the entire area.

Early in the forenoon of August 8, 1829, the "STOURBRIDGE LION" was "fired up" with Lackawaxen coal and ready to go. It was run back and forth on the straight portion of the track by Mr. Allen and then set forth on its history-making trip, for it was the first locomotive to run on a railroad in the Western Hemisphere, covering a distance of about one and a half miles to Seely's Mills, where it was reversed and returned to its starting point.

The "STOURBRIDGE LION" replica was built at the Delaware and Hudson Railroad's Colonie Shops after careful research to insure a true reproduction.

All iron parts have been hand-forged to duplicate the workmanship of the original and the same care exercised with respect to all the detail parts to obtain a true representation.

The replica has been operated under its own steam fired by anthracite.


MONTREAL
ROUSES PT.
PLATTSBURG
BURLINGTON
MONTPELIER
SARANAC LAKE
LAKE PLACID
PORT HENRY
NORTH CREEK
RUTLAND
WHITEHALL
GLENS FALLS
FORT EDWARD
SARATOGA SPRINGS
SCHENECTADY
TROY
ALBANY
COOPERSTOWN
ONEONTA
CHERRY VALLEY
SYRACUSE
UTICA
WATERTOWN
BINGHAMTON
OWEGO
CARBONDALE
HONESDALE
SCRANTON
WILKES-BARRE
KINGSTON
POUGHKEEPSIE
NEWBURGH
HARTFORD
WATERBURY
SPRINGFIELD
BENNINGTON
NEW YORK

THE L. F. LOREE

The "L. F. LOREE" is the first four outside cylinder, triple expansion, non-articulated locomotive, and was placed in service April 1933 on the Delaware and Hudson Railroad.

LOCOMOTIVE CHARACTERISTICS

Type		4-8-0
Weight on engine truck, pounds		69,000
Weight on drivers, pounds		313,000
Weight of engine, pounds		382,000
Weight of tender loaded, pounds		287,000
Weight of engine and tender, pounds		669,000
Boiler pressure, pounds		500
Cylinders	1 High pressure	20″ x 32″
	1 Intermediate pressure	27½″ x 32″
	2 Low pressure	33″ x 32″
Drivers, diameter		63″
Tractive effort, triple, pounds		75,000
Tractive effort, simple, pounds		90,000
Tractive effort, auxiliary locomotive, pounds		18,000
Tractive effort, maximum, pounds		108,000
Grate area, square feet		75.8
Valves and motion		Poppet, Rotary Cam
Feed water heater		Dabeg
Tank capacity		14,000 Gals., 17½ Tons
Fuel, kind		Bituminous
Track gauge		4′ 8½″

The "L. F. LOREE" is the fourth of a series of high pressure locomotives, the first three of which are 2-8-0 type cross compounds, carrying respectively 350, 400 and 500 pounds boiler pressure. All of these locomotives are used in freight service, the latest of which presents a marked departure from conventional design.

Steam is expanded in three stages, being used first in a high pressure cylinder under right side of cab, then in an intermediate cylinder under left side of cab and finally in two low pressure cylinders at front of locomotive, from which it exhausts through the stack.

Poppet valves actuated by a rotary cam gear are applied to all four cylinders, the drive being obtained by means of cranks secured at one end to the main crank pins.

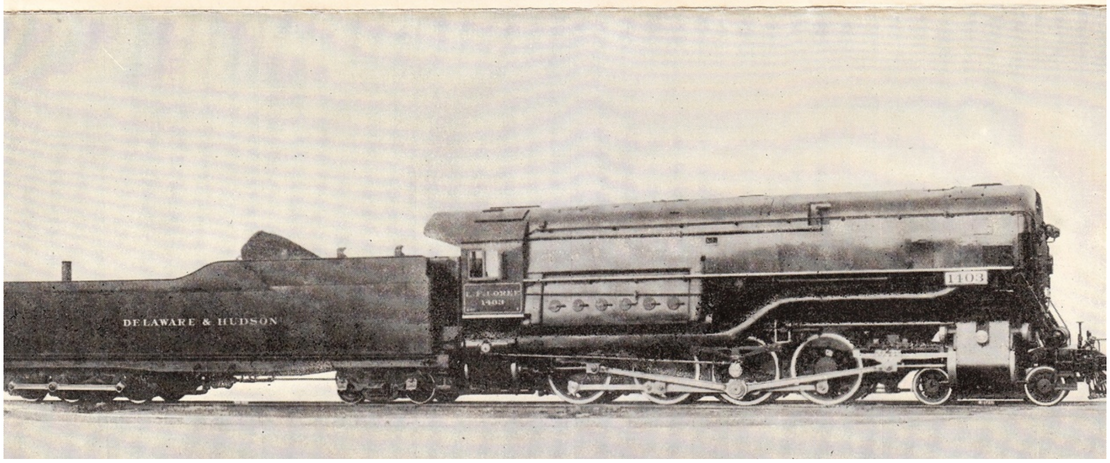
The boiler is of the water tube-fire tube type used on previous high pressure locomotives. The firebox drums, however, are seamless forgings of special steel, the use of which enabled a saving in weight of about 5300 pounds over those of the previous boilers.

The Delaware and Hudson Railroad, the first to apply roller bearings to the main driving axle of a locomotive, has from this experience made similar application on the "L. F. LOREE."

A Dabeg mechanical feed water heater pump, mounted below the left running board and driven from the front crosshead, supplies the boiler with water.

Main and side rods and crank pins are made of a special high grade steel.

The rear tender truck is a Bethlehem Auxiliary Locomotive, operating at full boiler pressure.



HOTEL CHAMPLAIN

Hotel Champlain is situated just south of Plattsburg, New York, on the summit of Bluff Point, the highest promontory of Lake Champlain, a region famous both for its natural beauty and its historic associations. To the east lie the lake, the distant shores of Vermont with its Green Mountains, and the White Mountains of New Hampshire. To the west the Saranac Valley and the Adirondacks.

The Cottages. Throughout the hotel park of over 800 acres are scattered numerous cottages. These cottages are completely furnished and have wide verandas.

Sports. The eighteen-hole golf course is of championship length and is the second oldest course in the United States. The Beach of the Singing Sands, directly below the hotel, provides a delightful spot for aquatic sports. The Green Drive, a turf bridlepath cut through the forest.

Dancing is held every evening except Sunday in the Louis XVI ballroom.

THE FORT WILLIAM HENRY HOTEL

The Fort William Henry Hotel, in the village of Lake George, New York, occupies the site of the old Fort William Henry at the foot of Lake George, properly called "Queen of American Waters". Its appointments are distinctly in keeping with the magnificence of its setting.

From the broad verandas one has a magnificent view of the lake with its verdure-clad islands dotting its blue expanse and the Adirondacks in the distance.

Boating through the lake is one of the charms of a visit to this region. Bathing in the crystal clear water of the lake is a popular pastime. Well-maintained tennis courts are available to guests as is golf at the Glens Falls Country Club.

The handsome Italian Pergola-Casino in front of the hotel on the lake shore provides unexcelled open-air dining and dancing.

From the hotel short trips make easily accessible the historical places of the region such as Saratoga, Schuylerville, and Fort Ticonderoga.

THE CHAMPLAIN TRANSPORTATION COMPANY

The Champlain Transportation Company, the oldest steamboat line in the world and a subsidiary of the Delaware and Hudson Railroad, operates the steamer "Chateaugay" as an automobile ferry between Burlington, Vermont and Port Kent, New York. The "Chateaugay" is a side-wheel steamer with a capacity for fifty automobiles without limit as to size and weight.

Ample provision is made for passengers with a covered saloon deck and an open sun deck. The trip itself is a delightful sail, crossing historic Lake Champlain at its widest point, within sight of the scene of the naval battle of Lake Champlain between the Americans under Benedict Arnold and the British under Sir Guy Carleton during the War of 1812.

"the D&H"

THE DELAWARE AND HUDSON RAILROAD

General Offices • Albany, N. Y.

AGENCIES

ATLANTA	Healey Building
BOSTON	Chamber of Commerce Building
BUFFALO	Ellicott Square Building
CHICAGO	327 South LaSalle Street
CLEVELAND	Terminal Tower Building
DETROIT	General Motors Building
MONTREAL	1117 St. Catherine Street, West
NEW YORK	*Freight* —60 East 42nd Street *Passenger*—33 West 42nd Street
PHILADELPHIA	Finance Building
PITTSBURGH	Koppers Building
ST. LOUIS	Railway Exchange Building

THE DELAWARE & HUDSON RAILROAD operates through portions of three states, Pennsylvania, New York and Vermont, and in these states passes through eighteen counties. The industrial and agricultural opportunities available in this territory are not only numerous but also exceedingly diversified. From the coal fields of Pennsylvania through the fertile farming valley of Schoharie to the capital district of the State of New York, devoted to manufacturing and unsurpassed as a distributing center, the Delaware & Hudson Railroad traverses a portion of the United States rich in raw materials. The Port of Albany to which 85% of the ships of the world can navigate all year round boasts of the largest single unit grain elevators in the world—thirteen million five hundred thousand bushels, and this deep water port brings the commodities of the Great Lakes district 142 miles nearer to the sea. To the north through the slate, marble and granite quarries of Vermont and the feldspar and iron ore deposits of the world-famed Adirondack Mountains to the Canadian border, one finds opportunities to engage in gainful occupation in a climate unequalled in America. The Adirondack Mountains from beautiful Lake George on the south to Lake Champlain and Lake Placid on the north, make this territory a veritable paradise for vacationists, and the mineral waters of Saratoga Springs are equally as beneficial as the waters of the European Spas.

Whether you are seeking a home, a business opportunity or merely a vacation, the Delaware & Hudson Railroad through its officers with their intimate knowledge of the territory, is in a position to give you all details.

GEORGE E. BATES, *Assistant to Vice President for Industrial Development.*

M. J. POWERS, *General Passenger Agent.*

Albany, N. Y.

48. 1936 D&H Inspection of Lines:

From the 1936 D&H *Inspection of Lines* book we learn that on June 18, 1889, the boiler of the *Stourbridge Lion* and a number of other parts of the engine (cylinder and walking beam) were presented to the Smithsonian Institution, and the locomotive was partially reconstructed.

In the March 13, 1890 issue of the *Honesdale Citizen*, we read:

"All the parts obtainable of the old Stourbridge Lion, the first locomotive that ever turned a wheel upon a railroad in America, the town being Honesdale, have been deposited in the National Museum, at Washington."

Portrait of Horatio Allen donated to Smithsonian Institution:
On an undated newspaper clipping in the archives of the Wayne County Historical Society, shown below, we see the portrait miniature, on ivory, of Horatio Allen that was created by Amelie d'Aubigny (1795/6-1861).

Allen Fired First Locomotive; The "Darned Thing Worked"

HORATIO ALLEN

Photograph of Man Who Piloted Famous "Stourbridge Lion" Presented to Smithsonian Institution; Later Became Famous Consulting Engineer and Builder

A miniature photograph of Horatio Allen, the first man to run a locomotive in this country, was presented to the Smithsonian Institution this week by the New York chapter of the Railway and Locomotive Historical Society.

The photograph was painted by d'Aubigny, a noted Parisian artist, after Allen had become a famous consulting engineer and builder.

In 1827 Allen was sent to England to purchase four engines for the Honesdale and Carbondale Railroad, a 17-mile line in Pennsylvania constructed to haul coal to the Delaware & Hudson canal. After assisting in designing and constructing the engines, Allen brought them to the United States in a sailing ship and landed them at their destination after apparently insuperable transportation difficulties.

In 1829 one of the engines, the "Stourbridge Lion," was fired up by Allen, and, according to his autobiography, "the darned thing worked." He says he was engineer, fireman, conductor, brakeman and passenger.

All that remains of the "Stourbridge Lion" is now a priceless relic of the Smithsonian Institution. Curiously enough, all trace of the other three engines has disappeared. Whether they worked or not nobody knows.

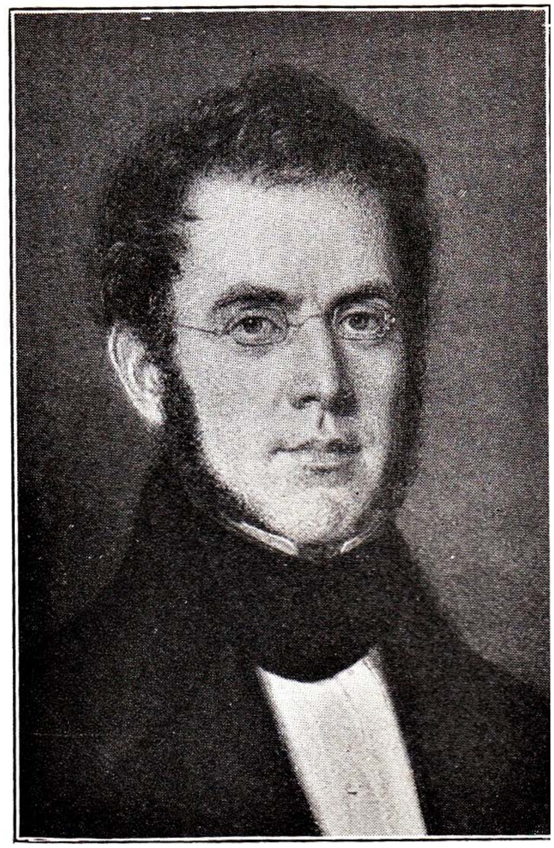
Allen left the Honesdale & Carbondale to become chief engineer of the South Carolina Railroad and constructed its line from Charleston to Augusta. He introduced the engine as motive power, making the quaint and prophetic observation:

"There is no reason to expect any material improvement in the breed of horses in the future, while only God knows what the breed of locomotives will place at the command of man."

Under Allen's direction the first locomotive ever constructed in this country was built at West Point. It was called the "Best Friend of Charleston" and was put in service in 1830.

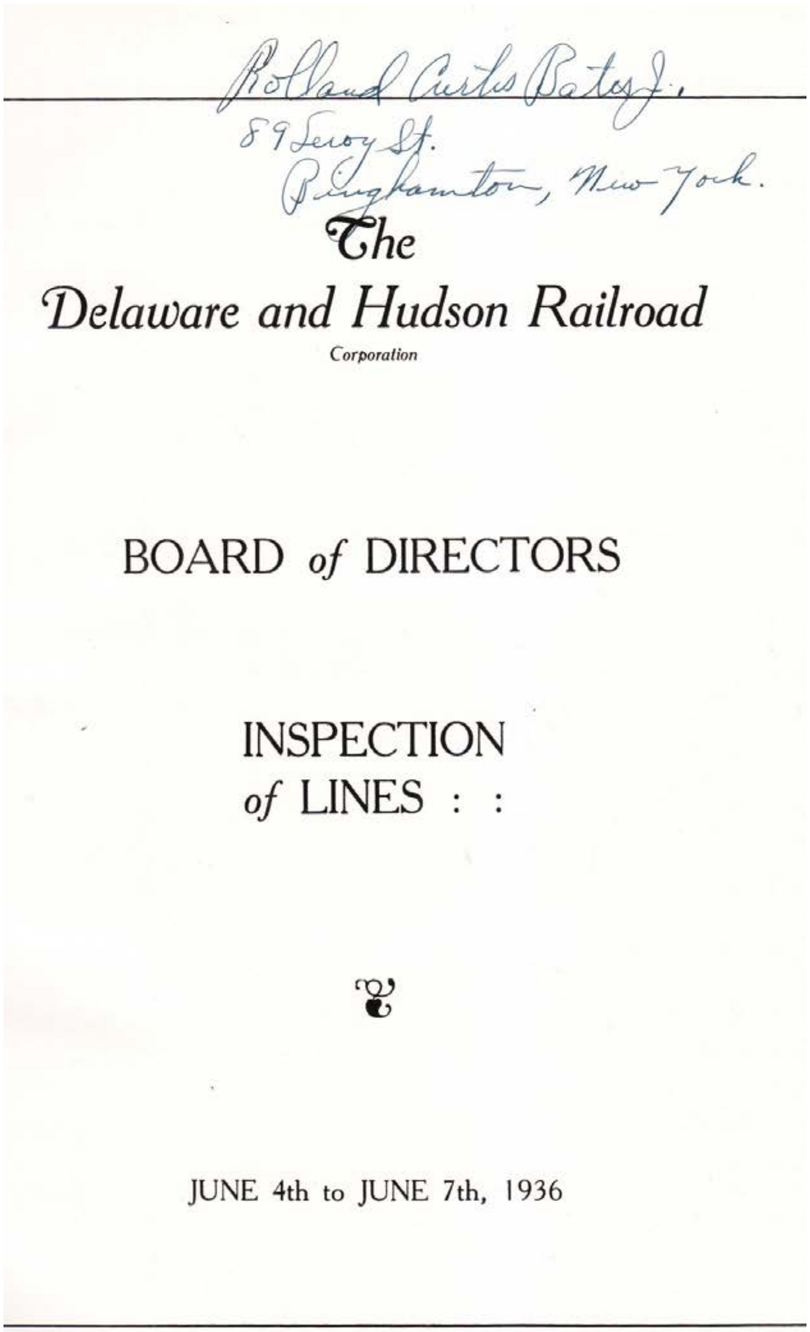
As consulting engineer Allen assisted in the construction of the Brooklyn Bridge and the Panama Railroad. He died in 1890.

The portrait miniature of Horatio Allen by Amelie d'Aubigny is given in *Century of Progress* on page 47, with the caption on the portrait that is given below.



Horatio Allen, in early life, from miniature on ivory by D'Aubigny, Paris, 1835.

Detailed data about the references consulted by the D&H in building the replica of the *Stourbridge Lion* in the locomotive shops at Colonie are presented in *Railroadians of America, New York, Book No.3, “Motive Power on the Delaware and Hudson,”* 1936, pp. 96-116, as follows:



Rolland Curtis Bates Jr.,
89 Leroy St.
Binghamton, New York.

The
Delaware and Hudson Railroad
Corporation

BOARD *of* DIRECTORS

INSPECTION
of LINES : :

JUNE 4th to JUNE 7th, 1936

Stourbridge Lion

57

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"Stourbridge Lion"

The "Stourbridge Lion" made its trial trip on the rails of the Delaware and Hudson Canal Company at Honesdale, Pennsylvania, August 8, 1829, which was the first operation, on a railroad, of a locomotive in America.

In the spring of 1933 a replica of this locomotive was constructed at Colonie Shops and exhibited at the Century of Progress Exposition, at Chicago, in the years 1933 and 1934.

The research and investigation incident to this development we here briefly record, with the thought in mind, to historically clarify some phases more or less in dispute.

REFERENCES CONSULTED

LOCOMOTIVE

I —"Catalog of Collections" in the Science Museum, South Kensington. Land Transport III, Railway Locomotives and Rolling Stock 1923.

II —Dimensioned prints of the "Agenoria," a sister locomotive to the "Stourbridge Lion," built by Foster, Rastrick & Company in 1829, furnished by the Curator of the Science Museum, South Kensington, London.

III —Photographs of the "Agenoria" obtained from the same source.

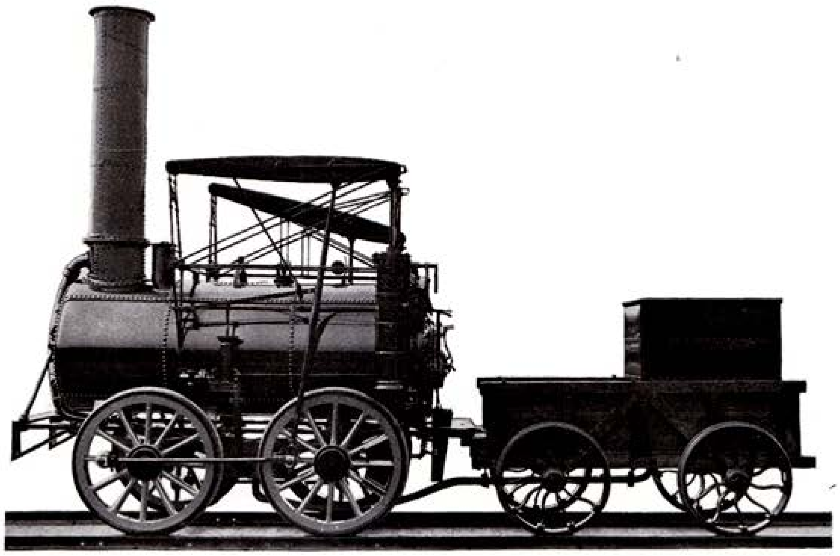
IV —"History of the Gravity Railroad of the Delaware and Hudson Canal Company" by John Torrey. This history was purchased by order of the Board of Managers, November 30, 1892.

V —"Treatise on the Steam Engine" published in 1830; by Prof. Renwick of Columbia College, New York. Prof. Renwick was also a Consulting Engineer, this evidenced by letters and reports he wrote in this capacity to Mr. Bolton, then President of the Delaware and Hudson Canal Company, with reference to the proposed railroad, which letters were examined. The engravings in this book were made from drawings developed by Prof. Renwick from actual measurements taken of the "Stourbridge Lion" while it stood beside the track at Honesdale, Pennsylvania, in 1829.

VI —"The Four Locomotives Imported into America in 1829 by The Delaware and Hudson Company" by L. F. Loree, M.Sc., Excerpt Transactions of The Newcomen Society, Vol. IV., 1923-24.

VII —"Practical Treatise on Rail-Roads" by Wood, published in 1838.

VIII —"The Steam Engine" by Tredgold, published in 1827.



REPLICA—STOURBRIDGE LION

Built by Foster, Rastrick & Co., Stourbridge, England in 1829. (Replica built by The Delaware and Hudson Railroad Corporation at Colonie Shops, May, 1933.) Type 0-4-0. Gauge of Track 4'3". Cylinders, Diameter 8½", Stroke 36". Driving Wheel Diameter 48". Tender Wheel Diameter 36". Boiler: Number of Courses, 3; Diameter of Middle Course, 48"; Thickness of Sheets, ½", Length, 10'5½", Steam Pressure 50 Pounds. Fire Box, Length 48", Diameter, 28½". Flues: Number of, 2; Length, 49"; Diameter, 18½". Wheel Base, Driving 5'1", Tender 5'0", Engine and Tender 16'1¾". Overall Length of Engine, 12'8½". Overall Length of Engine and Tender, 22'2¾". Overall height from rail, 15'0". Stack, Diameter, 18¼". Length of Walking Beams, 72½". Diameter of Crank Circle, 27". Engine Frames, Flat Wrought Iron. Grate Area, 8 sq. ft. Fuel, Anthracite. Weights: On Front Drivers, 9300 Pounds; Rear Drivers, 4700 Pounds; Total Engine, 14000 Pounds; Tender, loaded, 6300 Pounds; Total Engine and Tender, 20300 Pounds in Working Order. Heating Surface: Flues 56 square feet, Fire Box 23 square feet, Total 79 square feet. Tractive Power 825 Pounds. (Based on 30% efficiency, practice of that period). Tender Capacity, Water 400 Gallons, Coal 500 Pounds.

IX —"Railway Machinery" by Clark, published in 1855.

X —"History of the First Locomotive in America" by Brown, published in 1874.

XI —"Locomotive Engineering" by Colburn, published in 1871.

XII —"History of the Locomotive Stourbridge Lion" by G. C. Maynard.

XIII —Copy of "Bill of Material" developed by Foster, Rastrick & Company, covering the wheels and axles for the "Stourbridge Lion." The original is now in the Goldsmith Library, London University.

XIV —"Development of the Locomotive Engine" by Sinclair, published in 1907.

XV —"History of the Baldwin Locomotive Works" published in 1903.

XVI —Numerous letters of instruction to Horatio Allen while in England.

XVII—"The Stourbridge Lion" by Penniman, published in 1903.

TENDER

I —"Old Locomotives of the Delaware and Hudson Company and its after Acquired Lines through Stock Ownership and Lease Holds."

II —"Passenger, Freight and Work Equipment on the Delaware and Hudson."

III —"Treatise of The Locomotive" by Wood, published in 1832.

IV —"History of Wayne, Pike and Monroe Counties, Pa." by Mathews, published in 1886.

V —"Practical Treatise on Rail-Roads" by Wood, published in 1838.

VI —Photograph of No. 1 Locomotive of the Stockton and Darlington Railway.

VII —Engraving of the "Stourbridge Lion" by Clark.

VIII —"The Stourbridge Lion," by Penniman, published in 1903.

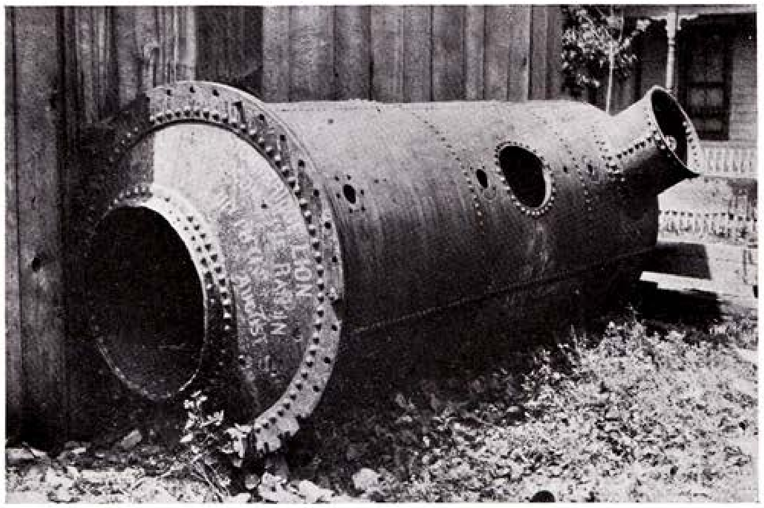
IX —"Coal Mining," by Chance, published in 1883.

X —Blue Prints of early Mine Cars from Hudson Coal Company.

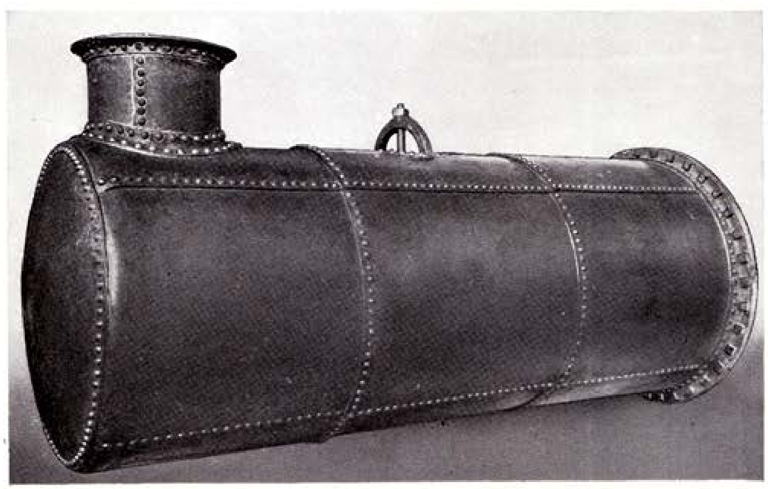
XI —Vouchers included in the Accounts of Engineer Jervis for the year 1829.

BOILER

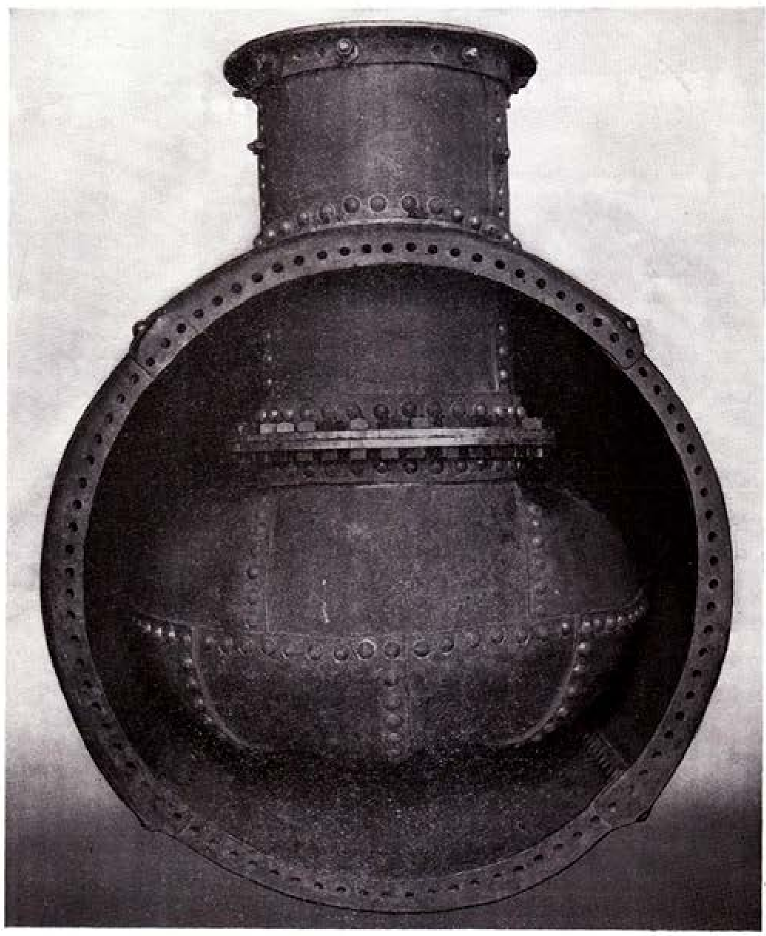
The original boiler is in the Smithsonian Institution, Washington, D. C., placed there June 18, 1890 by Lindsay & Early of Carbondale, Pennsylvania, accession number 23316.



Very accurately and fully detailed drawings of this boiler were made from the original. Such is at once evidenced by the irregular spacing and alignment of the rivets and the variation of the rivet heads both as to size and contour.



The back head, firebox and tubes, can be withdrawn from the boiler as a unit for repairs or cleaning, by removing the bolts in the back head flange and those in the stack extension flange indicating the purpose of the manhole in this boiler was to permit access to this inside stack flange. The design of the cover and holding agent was based on Prof. Renwick's drawing and is the conventional "crab" as still in use today.



There were no studs used in the boiler shell. Instead, for the fastening of parts, square headed bolts, much in the form of our present carriage bolt, with square nuts, was the practice of the period.

Under all bolting flanges a groove was chipped in the boiler shell, within the bolt circle, in which a soft wire was placed to provide a steam tight joint when the flange was drawn down.

IT IS OF SPECIAL INTEREST TO NOTE stress calculations of the boiler and method of construction meet our present day requirements.

Iron sheets were used in the original construction; as such were not available in the replica, steel was substituted.

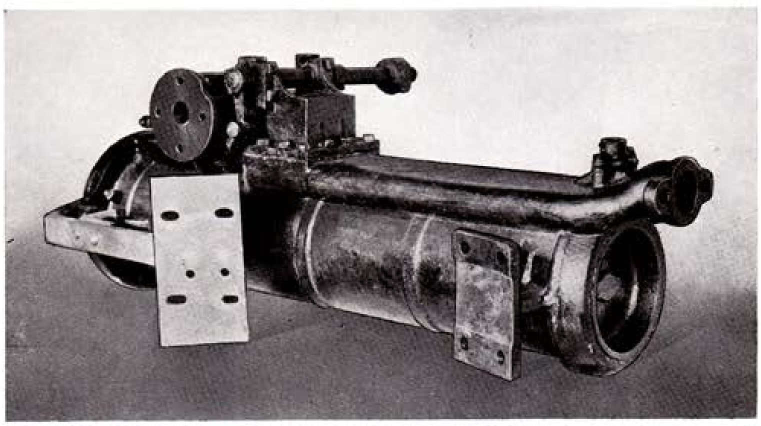
From "The Stourbridge Lion," by Penniman, published in 1903

Quoting: "As its name indicates, it was built at Stourbridge, and Mr. Allen informed the writer hereof that the 'Lion' was suggested by the fancy of the painter, who, finding on the boiler end a circular surface, slightly convex, of nearly four feet diameter, painted on it the head of a lion, in bright colors, covering nearly the entire area."

Our studies indicate the aforesaid Lion was probably of the heraldic type and accordingly the replica was so painted.

CYLINDERS, STEAM CHESTS, AND VALVES

One of the original cylinders is in the Smithsonian Institution placed there by Lindsay & Early, October 15, 1890, accession number 23649.



Similar care was exercised in the making of working drawings for these parts of the replica as obtained with the boiler.

The setting of the cylinders was determined by the location of the holes in the original boiler. The bottom cylinder head depended entirely on a pressure fit and is so arranged on the replica.

The valves were of the flat slide type having outside admission. The valve setting was deduced in the following manner. The difference of the overall length of the slide valve and distance over steam ports was 3/16", which equally divided determined the 3/32" steam lap. The difference between the inside edges of the steam ports and the inside edges of the valves was ⅛",

which equally divided gives a 1/16″ exhaust lap. When the valve was on center the clearance between the inside of the steam chest cover and valve stem locking nut was 1-3/32″. Therefore, with an allowance of 1/32″ clearance maximum travel of the valve upward would be 1-3/32″, minus 1/32″, or 1-1/16″. This 1/32″ clearance, considering wear on pins and bearings, and resulting lost motion, was not deemed a safe margin, and for practical purposes a clearance of 3/32″ was decided upon. The width of the steam port is ⅞″. To totally uncover said ports it is necessary for the valve to have a movement off center of ⅞″,—the width of the port plus 3/32″ steam lap, or 31/32″. Again considering the wear and lost motion condition, it is safe to assume the valve moved more than the required 31/32″ to ensure a full port opening at all times. If the movement of the valve was 1″ upward from the center, we would have 3/32″ clearance as shown above and an overtravel of 1/32″. Hence, it was decided to make the valve movement 1″ from center position giving a valve travel of 2″.

To check the setting of the valves, observation is had by the removal of the two cap screws in the outside wall of the steam chest.

Adjustment in the position of the valve, when found necessary due to erecting variations, was had by resetting locking nut between valve stem and valve yoke.

The operating shaft in the exhibit at the Smithsonian Institution WE BELIEVE IS NOT AN ORIGINAL. To substantiate this

(a) The shaft is so long the operating handle would have been far outside the reach of the engineman.

(b) The operating handle to shaft faces away from the operator.

(c) The cylinder was used as a horizontal stationary engine in the Foundry of Lindsay & Early at Carbondale, and it is reasonable to assume the said shaft, as it now stands, was applied to suit such requirements.

VALVE GEAR, MOTION WORK, ECCENTRICS, ETC.

From catalog of the South Kensington Museum, London, description of "Agenoria"

Quoting: "The slide valves, of the common flat type, are driven by loose eccentrics whose motion is controlled by stops, fixed to the axle, which retain them in the correct positions for forward or backward motion; hand gear is provided for working the valves when reversing, and until the eccentrics attain their positions against the stops."

From "History of the Baldwin Locomotive Works," description of "Old Ironsides"

Quoting: "The valve motion was at first given by a single loose eccentric for each cylinder, placed on the axle between the crank and the hub of the wheel. On the inside of the eccentric was a half-circular slot running half way around. A stop was fastened to the axle at the arm of the crank, terminating in a pin which projected into the slot. The engine was reversed by changing the position of the eccentric on the axle by a lever operated from the footboard."

From "History of the Gravity Railroad of the Delaware and Hudson Canal Company" by John Torrey

Quoting: "The valves regulating the passage of steam into and out of the cylinders were operated by rods and cranks connected with eccentrics on the rear axle, working at right angles, one to the other, so that when one piston was at full stroke either up or down, the other would be at half stroke."

From these brief descriptions, coupled with Prof. Renwick's drawing, the "Agenoria" drawings and photographs, and a sketch in Wood's "Practical Treatise on Rail-Roads," the design of the eccentrics and motion work was developed.

This consists of eccentric straps connecting to one arm of a rocker shaft fastened to the under side of the locomotive frame, the other arm connecting vertically to the valve operating shaft. In this vertical connection is the reversing mechanism. It comprises a pin clutch which when disengaged allows the engine-man to move the valve to the opposite position. When this condition obtains and the locomotive travels in the reverse direction the eccentrics move away from their stops in the half circular slot and cannot move the valve rigging again until they contact the stops at the opposite end of the slot. When this point is reached the vertical connecting rod moves again to a position where the pin is in alignment with the hole in the clutch, a flat spring forcing same into the hole and the mechanism is again tied together.

WALKING BEAMS

One of the original walking beams is now at the Smithsonian Institution, placed there June 20, 1888 by the Delaware and Hudson Canal Company, accession number 20761.

Our replica holds strictly to the original.

From it we definitely established the crank pin circle. The distance between the front trunnion and the back bearing of this beam is 72½". The distance from the forward trunnion to the main rod bearing is 53⅜", and

since the walking beam fulcrum is at the forward trunnion, the travel of the main rod was 53⅜" divided by 72½", or three-quarters of the total travel of the piston located at the rear bearing of the walking beam. The piston travel was 36", hence, the crank circle must have been three-quarters of 36" or 27". The distance from the piston rod bearing to the trunnion at center of the beam was 36¼" and established the length of the radius bars.

BRACES AND STRUCTURE FOR SUPPORTING THE MOTION OF THE WALKING BEAMS AND PISTONS

From "Catalog of Collections" in the Science Museum, South Kensington, London,

Quoting: "THE 'AGENORIA' LOCOMOTIVE (1829)." .... "This engine was built by Messrs. Foster, Rastrick & Co., of Stourbridge, for the Shutt End colliery railway at Kingswinford, Staffordshire, which it opened in June, 1829, and afterwards worked over for more than thirty-five years; it is almost identical with the 'Stourbridge Lion,' built by the same firm in 1828, and sent to America, where it was the first locomotive to run upon rails on that continent." ....

"DRAWINGS OF 'AGENORIA' LOCOMOTIVE (1829)." .... "These are dimensioned working drawings of the engine as it now stands."

From these photographs and drawings the design was developed for all of the top structure including such details as the split bushings, straps and taper keys for securing rods to same at all bearing points.

All forgings were hand made on the original and we so fabricated on the replica.

The base of location for most of this structure was developed from the original boiler and cylinders.

MAIN AND CONNECTING RODS

The same sources of information were the bases for development of these parts. It is interesting to note the knuckle pin between the main rod butt end and the connecting rod to take care of the angularity of the main rod. These details are hand forged on the replica.

ENGINE FRAME

Prof. Renwick's drawing was the basis on which this part was designed.

BOILER AND AXLE MOUNTING TO FRAME

The boiler is mounted on the frame by three brackets on each side and stiffened by two braces at the front, all located from the original boiler.

The rear axle was tied to the frame by its housing. At the front axle there is an elliptic spring in place of the frame casting. This spring bears at each end on the under side of the frame and must be free at each end to permit flexibility.

From "Catalog of Collections" in the Science Museum, South Kensington, London,

> Quoting: "THE 'AGENORIA' LOCOMOTIVE (1829)." ....
> "Springs are fitted to the front axleboxes only, as the action of the vertical connecting rods would have prevented their use over the rear axle."

WHEELS, TIRES AND AXLES

The original tires are in the Smithsonian Institution and were placed there by the Delaware and Hudson Canal Company, June 20, 1888, accession number 20761.

The gauge of the gravity railroad was four feet three inches, therefore the "Stourbridge Lion" must have been the same.

The original tires at Washington are 48" diameter over tread and are 4" wide with a ¾" flange. The thickness of these tires varies from ⅝" to ¾". In the replica these are made ¾" thick with a 1" flange. The change in heighth of the flange was decided upon for safety of operation of the replica.

The retaining rings, also at Washington, for the fellies vary in thickness from ½" to ⅝". On the replica these were made ½". Through these tires and retaining rings are six rivet holes equally spaced. Since one rivet is used to tie the joint of the adjoining fellies tightly against the retaining ring, it was decided there were six fellies with two spokes in each, hence, twelve spokes to each wheel.

IT IS OUR REASONED OPINION THE CIRCULAR IRON BANDS ON THE FACE OF THE WHEELS, BOLTED TO THE SPOKES, NOW ON THE "STOURBRIDGE LION" IN THE SMITHSONIAN INSTITUTION, WASHINGTON, D. C., AND QUITE GENERALLY SHOWN ON CUTS FROM TIME TO TIME, DO NOT BELONG ON THE "STOURBRIDGE LION." Our reasons are

(a) This design was not typical of Foster, Rastrick & Co., but was used by Stephenson.

THE SCIENCE MUSEUM,
SOUTH KENSINGTON,
LONDON, S.W.7.
1/6/27

L. F. Loree Esq.

Dear Mr. Loree,

A short while ago a Mr. Edwards of the Motive Power Dept. of the Delaware & Hudson R.R. Co, called on me relative to the reconstruction of the "Lion" which is contemplated by your company in connection with the Centenary Celebration in Aug 1928.

We supplied him with drawings and photographs of our "Agenoria" but Mr. Edwards was unfortunately unable to make a further call on me.

I send, herewith, for transmission to Mr. Edwards, a note found amongst Rastrick's papers which appears to refer to locomotive wheels he was making or had made, presumably for the 3 American engines or for "Agenoria".

This note may be of use in the reconstruction of the wheels, and would certainly support the Washington story that the ironwork of the wheel now shown with the engine really belonged to the "America".

Trusting this information may be of some use.

I remain
Yours truly
E. A. Forward.

Treasurer
Newcomen Society.

Notes written in a letter dated Nov 1826, amongst the Rastrick Papers in the Goldsmiths' Library, London University

1 axle tree 1. 3. 7 @ 84/-	7. 12. 3
2 Pins for do. 4½ @ 84/-	3 5
8 Steel keys for do 2 @ 112/-	2. 0
Fitting on the wheels & cutting the cotter holes.	1. 0. 0
6 Felleys @ 3/6	1. 1. 0
12 spokes @ 1/4	16. 8
Making the wheel	1. 10. 0
1 Cast iron centre piece 3. 16 @ 18/-	15. 11
1 Wrot iron arm 1. 5 @ 11/-	1. 13. 3
Fitting do	1. 10. 0
Files &c	5. 0
Key for do	6
1 Wt iron tyre 1. 3. 22 @ 48/-	4. 1. 9
Fitting on tyre	10. 0
Cutting 6 holes and rivetting	4. 0
6 rivets & washers 3½ @ 5 1/2	1. 5
Turning 1 wheel	1. 0. 6

An undated loose slip gives the following.

Axletree for locomotive engine	c. qr. lb. 1. 3. 7
1 Pin for do	2½
1 Hoop for wheel do	1. 3. 21
6 pins & washers do	3½
4 steel keys for do	1
1 wrought iron arm for the wheel	1. 3½
1 Cast iron Knoff ?	3. 6

P.T.O.

Notes on above.

Revolving pin was Rastrick's term for crank pin.
Pin sometimes means rivet or screw in Rastrick's writings.
Hoop corresponds with Tyre.
The 6 pins & washers are the rivets fastening the tyre to the wooden rim of wheel.
The crank pin was evidently carried on an iron arm extending from centre to rim or right across a diameter, and not on iron rings as shown in Newcomen Society Lion drawing.
This arrangement was used by Stephensons in 1830.

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(b) Foster, Rastrick & Company's bill of material for wheels and axles does not mention any such bands.

(c) Prof. Renwick's drawings made from actual measurements while the "Stourbridge Lion" was standing off the track at Honesdale, Pennsylvania, 1829 does not show such bands.

(d) The crank pin circle of these bands is 24½" while we have definitely established such as 27" on the "Stourbridge Lion."

In the Foster, Rastrick & Co. bill of material (cut of original given) we find listed:

"1 Cast iron centre piece 3.16" .... which translated is three-quarters of one hundred weight plus sixteen pounds, or a total of ninety-one pounds.

"1 Wrot iron arm 1.5¼" .... which translated is thirty and one-quarter pounds.

It was felt these items must be the hub and one metal spoke for the crank pin. On the replica this hub and spoke is an integral casting.

IT IS INTERESTING TO NOTE THE PROPORTIONS AS DECIDED UPON FOR THE HUB AND SPOKE, BY SCALING PROF. RENWICK'S DRAWING, GAVE A FINISHED WEIGHT VERY CLOSE INDEED TO THE ABOVE FIGURES.

On this replica the crank pins were pressed through the iron arm and fastened by a nut on the inside.

From "History of the Gravity Railroad of the Delaware and Hudson Canal Company" by John Torrey

Quoting: "The hubs of the wheels were of iron, and were so fastened to the axles that they could not revolve without the axles revolving with them."

COUNTERBALANCE

Much dispute is had whether or no the main wheel of the "Stourbridge Lion" was counterbalanced.

FOR THE NEGATIVE SIDE THE FOLLOWING IS FAVORABLE:

From "Development of the Locomotive Engine" by Sinclair, published 1907,

Quoting: "Counterbalancing the driving wheels," .... "........... was not tried in England until 1839, several years after it had been successfully carried out in the United States."

From "Locomotive Engineering" by Colburn, published 1871,

Quoting: "The remaining improvement effected, in 1837, in the Locomotive engine, was the introduction of counterweights in the driving wheels."

In 1837 Mr. Rogers of Rogers Locomotive Works filed a specification described as follows:

Quoting: "The nature of my improvement consists in providing the section of the wheel opposite to the crank with sufficient weight to counterbalance the crank and connecting-rods, ..."

From "Railway Machinery" by Clark, published in 1855,

Quoting: "In 1838 he (Mr. George Heaton) experimented with a model of a railway-carriage wheels and axle ...." "............ He classed the driving wheels and axles of locomotives, with their revolving appendages, as unbalanced wheels; and proposed to apply counterweights to the wheels, between the spokes, to balance the revolving masses, ..."

FOR THE POSITIVE SIDE THE FOLLOWING ARGUMENTS ARE PRESENTED:

Prof. Renwick's drawing made to scale from careful measurements of the "Stourbridge Lion," when the locomotive was at Honesdale in 1829 and later appearing in his book "Treatise on the Steam Engine" published in 1830, clearly shows counterbalance on the main wheel. It is hardly probable anyone would add such weight if it was not on the locomotive without mentioning it. Was Prof. Renwick years ahead of the locomotive builders in a realization of the need of counterbalancing and so showed it? Was it a mere coincidence in the event there was no balance, that he should show balance only on the main wheels? It is more than a mere coincidence that a counterbalance as scaled from Prof. Renwick's drawing and applied to this replica does balance approximately fifty percent of the revolving and reciprocating weights.

From "History of the First Locomotive in America" by Brown, published in 1874,

Quoting: "Annexed we give a sketch of the 'Stourbridge Lion' from an original drawing of the machine, ..."

THIS SKETCH SHOWS COUNTERBALANCE.

From "Practical Treatise on the Rail-Roads" by Wood, published in 1838, we find that in the early part of 1829 Mr. Rastrick and Mr. Walker made a number of experiments while pursuing their inquiries as to the moving power to be adopted by the Liverpool and Manchester Railway. Mr. Wood,

the author of this book was closely associated with Mr. Rastrick and describes results of some experiments made pertaining to the amount of effective adhesion of drivers as follows

Quoting: "..........We had frequent opportunities of observing this; and some experiments, which were made, proved the fact beyond any doubt. The following experiments, made with Messrs. Walker and Rastrick, while pursuing their inquiries, as to the moving power to be adopted upon the Liverpool and Manchester Railway, will, perhaps, shew this very clearly; and which corroborated other experiments we (meaning Wood and Rastrick) had made for the same purpose."

Evidently this must have been before the early part of 1829, because Mr. Wood states "WE HAD MADE." In conjunction with his description of these experiments, Mr. Wood makes the following statement

Quoting: "The action of the power of the cylinders upon each of the wheels of the engine," .... "is extremely irregular; when the piston, for instance, is at the top of one of the cylinders, say No. I, the power has no effect in turning the wheels round, and the circumvolution is effected by the other cylinder, No II, through the connecting rod on each side of the wheels, pushing the pair of wheels, No. I, round. When, however, the crank on the wheels, No. I, has arrived at a certain period of its revolution, the action of the cylinder, No. I, gradually becomes greater, then equal to No. II, and then the predominant moving power, when the other pair of wheels, No. II, is dragged round by the action of the cylinder, No. I; each pair of which is thus alternately pushed, and dragged forward, by the action of the pistons, and the connecting rods;" .... "such interchanges, in the intensity of the action of their forces, induce, at certain intervals, a slipping of the wheels. The weight of the pistons, and their connecting rods, also, are not balanced; and which, by producing an irregularity in the pressure on the rails, has the effect, also, of inducing a slipping on the descending, rather than on the returning, stroke; ...."

THIS INDICATES THAT MR. RASTRICK, WHO WAS THEN BUILDING THE "STOURBRIDGE LION," HAD PRIOR TO 1829 A KNOWLEDGE OF THE NEED OF A COMPENSATING AGENT WHICH RESULTED IN COUNTERBALANCE.

From "The Steam Engine" by Tredgold, published in 1827,

Quoting: "There will, I think, be some advantage in making the pistons act together, because the effect will be as great as by dividing it, supposing both methods to be perfect; and in acting together there would be less interference of the motion of the one with that of the other."

The replica as built has counterbalance in the main drivers.

From "History of the Gravity Railroad of the Delaware and Hudson Canal Company," by John Torrey,

Quoting: "The spokes and felloes were of oak wood, and were painted a bright red."

FEED WATER PUMP AND OPERATING MECHANISM

The feed water pump is on the left side of the boiler actuated by a rod driven by the walking beam. The amount of water pumped is controlled by regulating the length of the stroke, which is very clearly shown on the cuts.

Between the pump and the boiler is a large shutoff cock which permits work being done on pump, valves or piston while boiler is under steam.

The pump consists of a vertical cylinder, open at the top. The bottom of the cylinder opens into a rectangular chamber, in one end of which is located the suction valve, and in the other, the discharge valve. The valves are of the weight type with tapered seats movement being had whenever suction or pressure is applied to their heads. At the end of each stroke there is a momentary period when the suction action is changed to a pressure or discharge action and vice versa. During this brief changeover, the intake valve will close itself due to its weight and will be held there by the pressure of the water in the cylinder and chamber, which also raises the discharge valve and forces the water into the boiler. At the changeover from discharge to suction, the discharge valve is seated by gravity and is held closed by the boiler pressure. Since the upward action of the pump with both valves closed would create a vacuum, the suction action lifts the intake valve and permits the pump to raise the water from the preheater to await another reversal of motion. A capacity test of the pump was made developing it was capable of delivering thirty percent above cylinder requirements at five miles per hour.

By disconnecting the operating rod and operating the lever by hand, water can be supplied to the locomotive while standing if found necessary.

THROTTLE, THROTTLE VALVE, AND STEAM PIPES

The throttle was at the rear on top of the boiler, the throttle lever being within easy reach of the engineman, exact location had from original boiler. We find from references the throttle was in part a tee shaped casting, one leg of which went to the boiler and one to each steam pipe, thence to the steam chest. At right angles through this tee the casting housed the valve.

FEED WATER HEATER

From Mr. Rastrick's letter dated June 13, 1829 to W. & J. Brown & Co., London, in explanation of the delay in forwarding the last of the three locomotives contracted for by Mr. Horatio Allen, we find

> Quoting: "........... I have made some very important additions and improvements" .... "and when I have wrote Mr. Allen, from whom I have had a letter and send him the drawings and details, I know he will feel I have done everything for their advantages, and that the delay of a few months will be amply compensated for by the improvements of the engines. I will send the whole off in ten days."

These improvements consisted in part of a feed water heater fitted up with pipes, etc.

From "History of the Gravity Railroad of the Delaware and Hudson Canal Company," by John Torrey,

> Quoting: "The railroad, however, was not quite ready for the trial (of the locomotive upon it) and Mr. Allen occupied a few days in having some improvements made. He employed a worker in sheet iron to construct a small water holder to be placed under the boiler, from which the boiler was to be supplied, instead of obtaining such supply direct from the tank of the tender."

Prof. Renwick's drawing shows such a heater was applied to the "Stourbridge Lion," hence, to replica.

SAFETY VALVES

Two safety valves were applied located from the original boiler. One valve of weight and lever type functioned as internal pressure overcame the load applied to the valve. Variation of relieving pressure was made by the movement of the weight along the lever. The design of the valve applied was developed from Prof. Renwick's drawing, which very carefully details the structure. The lever which carried the weight was limited in its movement by guides regulating the maximum open position. This valve is located just back of the manhole on top of the boiler.

From "History of the Gravity Railroad of the Delaware and Hudson Canal Company," by John Torrey

> Quoting: "The boiler had two 'safety valves' one of which was placed in rear of the centre of the top of the boiler, where the engineer could have ready access to it, and the other was placed very near to, and in rear of the chimney and was so covered by a small dome as not to be easily accessible."

Also from the same book by John Torrey

> Quoting: "In 1829, the Liverpool and Manchester Railroad Company offered 'a prize of 500 pounds for the best locomotive' for their road, and one of the specifications was 'The boiler must have two safety valves, neither of which must be fastened down, and one of them must be completely out of the control of the engineer'."

This explains the presence of a small dome directly in back of the stack.

While we were able to develop in old volumes data to enable us to build this type of a safety valve, probably a spring loaded type, as a precaution in this location we applied a standard present day safety valve. The dome covering, however, is as outlined in Prof. Renwick's drawing.

GRATES, BACK HEAD, FIRE DOOR ARRANGEMENT, ASH HOPPER, ETC.

From the designs of the "Agenoria" and the drawing by Prof. Renwick, sufficient information was available to accurately provide these parts.

STACK

The heighth over stack of the "Agenoria" is twenty-one feet five inches. From the "Catalog of Collections" in the Science Museum, South Kensington, describing the "Agenoria" we find

> Quoting: "The exhaust steam is turned into the chimney, but, from the exceptional height of the latter, it is probable that this blast was not utilised to increase the draught; at the time the engine was built, great objections were raised to the noise of locomotives, and also to the smoke given off; these annoyances would be reduced by a quiet exhaust and a tall chimney."

From letter of instruction to Mr. Horatio Allen from Mr. J. B. Jervis, dated January 16, 1828,

> Quoting: "It is supposed anthracite coal does not require so high a chimney as other fuel, but I am not possessed of any particular facts on this subject; I presume you can have the chimney so constructed that an additional piece may be attached, if it is found on trial to require it."

The stack on the replica was provided with a flange at the top to receive such additional piece, and from scaling and descriptions we were led to believe the heighth from rail to top was fifteen feet and the replica was so constructed.

TENDER

From "Old Locomotives of the Delaware and Hudson Company and its after Acquired Lines Through Stock Ownership and Lease Holds" we have

> Quoting: "At Honesdale a tender was added to her, one of the coal wagons (as the cars were then known) being utilized for that purpose. She was first tried out on August 8, 1829............"

From "Passenger, Freight and Work Equipment on the Delaware and Hudson"

> Quoting: "According to journal entries posted in 1829, seventy 'wagons' were purchased from the West Point Foundry ...."
> "............ This early type of coal car appears to have had a carrying capacity of about one and one-half to two tons. The box or body was of wood construction. The wheels, of which there were four, one pair at each end, were cast iron of spoke design."

From "Treatise of The Locomotive" by Wood, published in 1832, we have this description by Mr. James Archbald to Mr. Wood, in his article on the original plans of the gravity railroad,

> Quoting: "Weight of wagon 1 ton; ditto of load 2-½ tons; wheels 3 feet diameter; axles 2-¼ inches; one loose wheel on each axle."

In the history of Wayne, Pike and Monroe Counties, Pennsylvania, by Mathews, published by Peck & Co. in 1886, we find an account of the "Stourbridge Lion" and its initial run. This account was founded on an article which appeared in the Honesdale Citizen in 1881 and was written on information received from Mr. Allen and authoratively endorsed by him when completed. In this account is an engraving showing the "Stourbridge Lion" and tender. The tender shows curved spoke wheels. With the replica the curved spokes were made of flat wrought iron, placed in the mould and cast in the hub.

In the references consulted the wheels all showed ten spokes. This may be a mere coincidence or typical of the design of the period.

From "Practical Treatise on Railroads" by Wood, published in 1838

> Quoting: "Fig. 4, Plate VII shews an improved plan of this kind of bearing, which is much used, for carriages." ...."Until recently the lower side of the axle was exposed, and the dust of the railroad operated very injuriously to the progress of the carriages............"

We designed our wheels, axles, and axle bearings from these descriptions.

The superstructure of the tender was made to suit the capacity as outlined by Mr. Jervis. Scaling the engraving by Mr. Clark, it was found a tender built to such dimensions would have the specified capacity. From prints obtained from the Hudson Coal Co., Scranton, Pennsylvania, several sizes of lumber used were determined, such representing the earliest type of mine "waggons."

From "Coal Mining" by Chance, published in 1883, the coupling arrangement, consisting of a round iron eyebolt so arranged same extended through the end sill and crossbearer, and so prevented from pulling out by tapered keys driven through the bolt and drawn tight against the end sill and crossbearer.

This car also had metal bands around the end of the side sills to prevent same splitting.

The draw gear between engine and tender was developed from Clark's engraving. It is a long pin applied from the top of the tender deck which passes through the end sill, through the coupling link of the engine and the eyebolt of the tender.

The cistern has a capacity of four hundred gallons and is based on Clark's engraving.

The feed water line is a leather pipe connecting the tender to the feed water heater, assuring flexibility between engine and tender. Reference to this leather pipe was found among vouchers included in the Accounts of Chief Engineer Jervis for 1829

Quoting: "............Aug. 1, one leather pipe for locomotive engine"
.... "painting waggon for locomotive tender $2.50,
..........."

Summary Statement:

One of the original walking beams of the *Stourbridge Lion* is in the Smithsonian Institution, placed there on June 20, 1888, by the Delaware and Hudson Canal Company; accession number 20761.

The original tires are in the Smithsonian Institution and were placed there by the Delaware and Hudson Canal Company, June 20, 1888; accession number 20761.

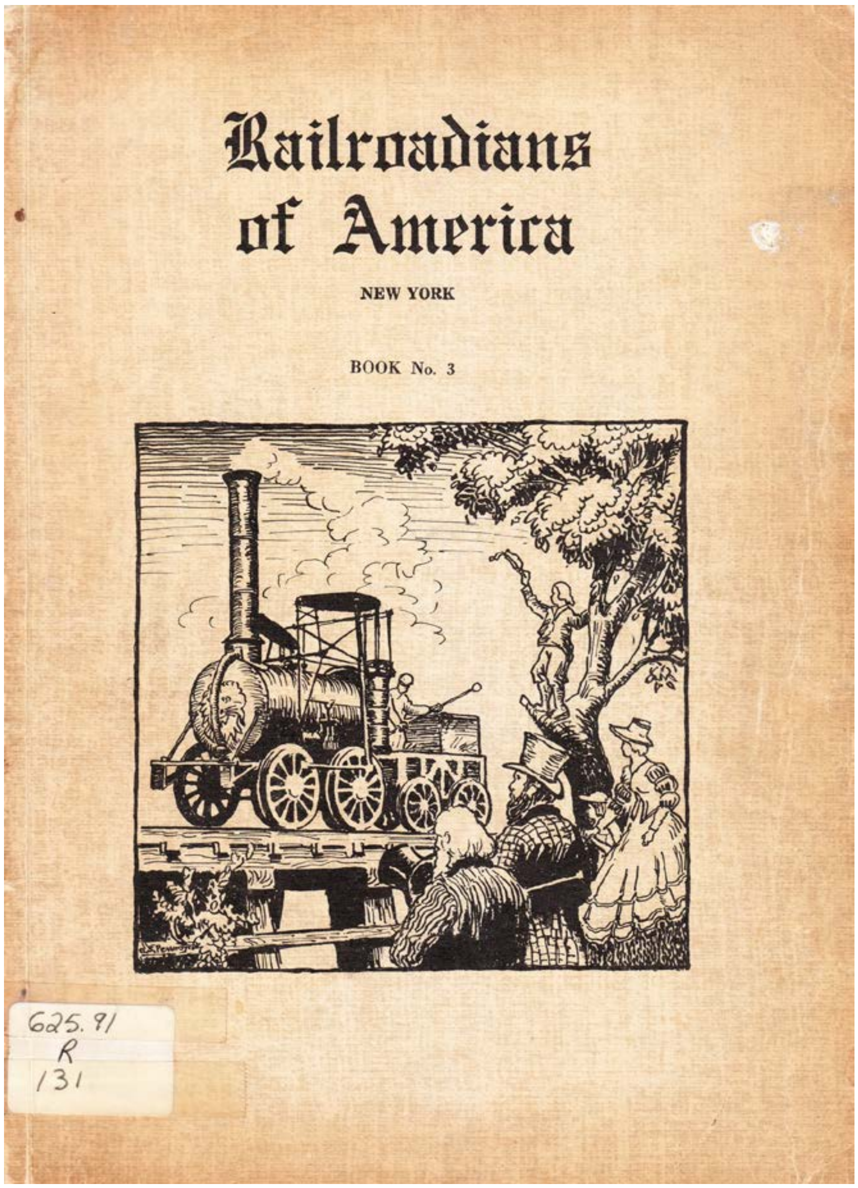
The original boiler of the *Stourbridge Lion* is in the Smithsonian Institution, Washington, D. C., placed there June 18, 1890, by Lindsay & Early of Carbondale, PA; accession number 23316.

One of the original cylinders of the *Stourbridge Lion* is also in the Smithsonian, placed there by Lindsay & Early on October 15, 1890; accession number 23649.

49. 1941:

Railroadians Book 3

Data about the *Stourbridge Lion* from the 1926 and the 1936 *Inspection of Lines* books that were produced by the D&H were included in *Railroadians of America Book No. 3,* that was published in 1941, as follows:



Railroadians of America

NEW YORK

BOOK No. 3

AN illustrated record of the motive power and growth of the Delaware and Hudson railroad. Originally printed in two books published by the company entitled:

Motive Power on the Delaware and Hudson
The Delaware and Hudson Company
Board of Managers
Inspection of Lines
June 10th, to June 13th, 1926

and

Motive Power, Passenger Freight, and Work Equipment 1926-1936
The Delaware and Hudson Railroad Corporation
Board of Directors
Inspection of Lines
June 4th to June 7th, 1936

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Published by Railroadians of America, New York

PREFACE

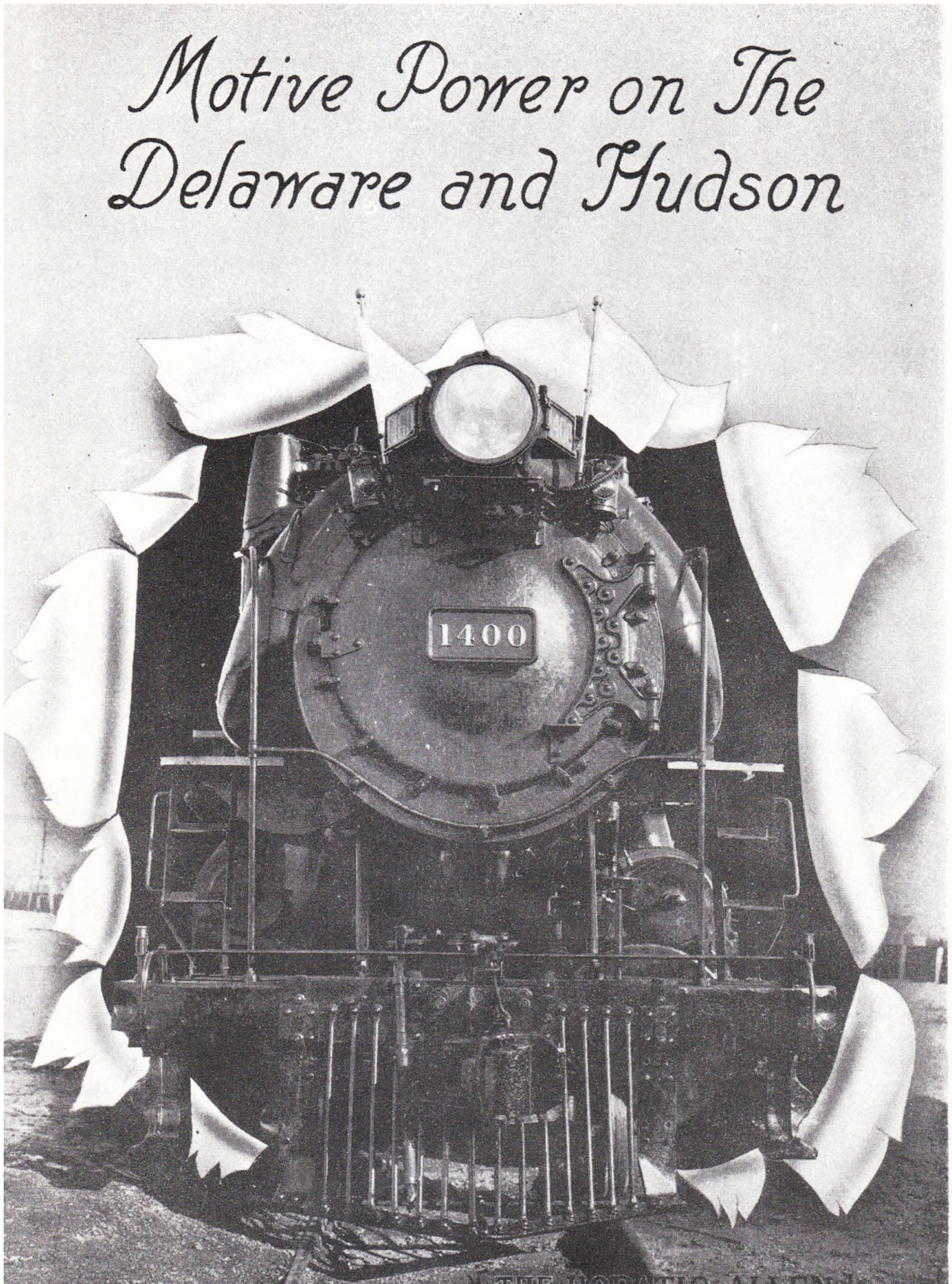
In presenting the third book to the members of the Railroadians of America we believe that it fulfills a desire of many of those whose interest lies in the development of motive power on American railroads. The historical part played by the Delaware and Hudson in the development of the locomotive is generally known and to further acquaint the stockholders with the details of this work the company published and distributed privately the following material. To this has been added numerous photographs and information that makes the record more extensive and brings the pictorial history of the motive power on the Delaware and Hudson up to date.

We wish to thank C. L. Winey for the loan of one of the books and G. H. Caley for the other which were combined to form the present volume.

The original chapters were compiled under the direction of G. S. Edmonds, Superintendent of Motive Power. The preface to these chapters states that it is surprising the comparatively little reliable information available regarding the early motive power in America. Failure to make records, or if made, but fragmentary; the loss or destruction of records; the passing of the pioneers, whose personal knowledge, unrecorded, lies buried with them, all combine to make the lot of the historian an unenviable one and the result of his efforts susceptible to criticism. Fully realizing these conditions an earnest endeavor has been made in compiling this work to make the subject matter presented as reliable as humanly possible.

Walter A. Lucas, Editor and Chairman,
Publication Committee, Railroadians
of America, 56 Tuxedo Avenue,
Hawthorne, N. J.

April 26, 1941.


Motive Power on The
Delaware and Hudson
1400
THE HORATIO ALLEN
1924

The "Stourbridge Lion," from the original painting which hangs in the D. & H. office at 230 Park Avenue, New York. Painted by A. Sheldon Pennoyer.

"Stourbridge Lion"

The "Stourbridge Lion" made its trial trip on the rails of the Delaware and Hudson Canal Company at Honesdale, Pennsylvania, August 8, 1829, which was the first operation, on a railroad, of a locomotive in America.

In the spring of 1933 a replica of this locomotive was constructed at Colonie Shops and exhibited at the Century of Progress Exposition, at Chicago, in the years 1933 and 1934.

The research and investigation incident to this development we here briefly record, with the thought in mind, to historically clarify some phases more or less in dispute.

REFERENCES CONSULTED

LOCOMOTIVE

I —"Catalog of Collections" in the Science Museum, South Kensington, Land Transport III, Railway Locomotives and Rolling Stock 1923.

II —Dimensioned prints of the "Agenoria," a sister locomotive to the "Stourbridge Lion," built by Foster, Rastrick & Company in 1829, furnished by the Curator of the Science Museum, South Kensington, London.

III —Photographs of the "Agenoria" obtained from the same source.

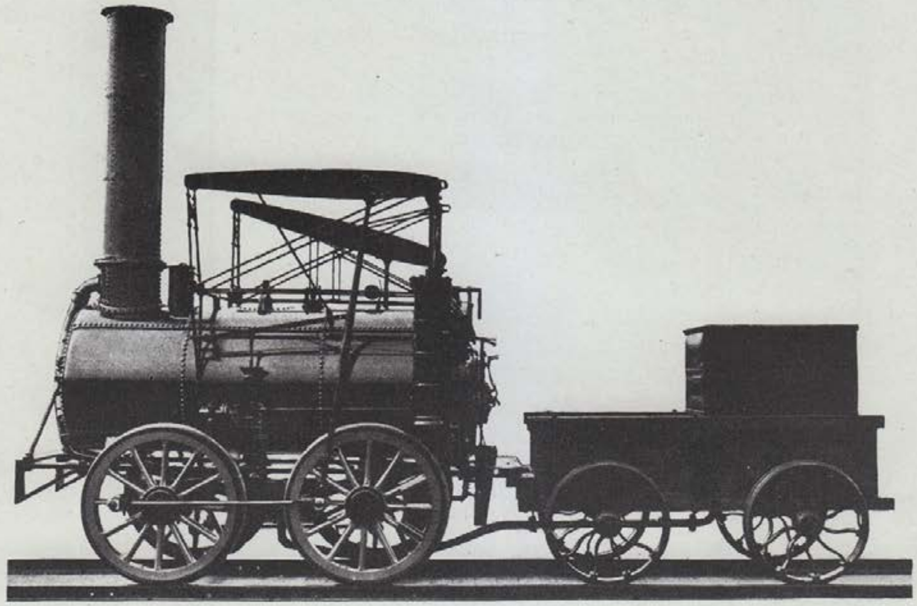
IV —"History of the Gravity Railroad of the Delaware and Hudson Canal Company" by John Torrey. This history was purchased by order of the Board of Managers, November 30, 1892.

V —"Treatise on the Steam Engine" published in 1830; by Prof. Renwick of Columbia College, New York. Prof. Renwick was also a Consulting Engineer, this evidenced by letters and reports he wrote in this capacity to Mr. Bolton, then President of the Delaware and Hudson Canal Company, with reference to the proposed railroad, which letters were examined. The engravings in this book were made from drawings developed by Prof. Renwick from actual measurements taken of the "Stourbridge Lion" while it stood beside the track at Honesdale, Pennsylvania, in 1829.

VI —"The Four Locomotives Imported into America in 1829 by The Delaware and Hudson Company" by L. F. Loree, M.Sc., Excerpt Transactions of The Newcomen Society, Vol. IV., 1923-24.

VII —"Practical Treatise on Rail-Roads" by Wood, published in 1838.

VIII —"The Steam Engine" by Tredgold, published in 1827.



REPLICA—STOURBRIDGE LION

Built by Foster, Rastrick & Co., Stourbridge, England in 1829. (Replica built by The Delaware and Hudson Railroad Corporation at Colonie Shops, May, 1933.) Type 0-4-0. Gauge of Track 4′3″. Cylinders, Diameter 8½″, Stroke 36″. Driving Wheel Diameter 48″. Tender Wheel Diameter 36″. Boiler: Number of Courses, 3; Diameter of Middle Course, 48″; Thickness of Sheets, ½″, Length, 10′5½″, Steam Pressure 50 Pounds. Fire Box, Length 48″, Diameter, 28½″. Flues: Number of, 2; Length, 49″; Diameter, 18½″. Wheel Base, Driving 5′1″, Tender 5′0″, Engine and Tender 16′1¾″. Overall Length of Engine, 12′8½″. Overall Length of Engine and Tender, 22′2¾″. Overall height from rail, 15′0″. Stack, Diameter, 18¼″. Length of Walking Beams, 72½″. Diameter of Crank Circle, 27″. Engine Frames, Flat Wrought Iron. Grate Area, 8 sq. ft. Fuel, Anthracite. Weights: On Front Drivers, 9300 Pounds; Rear Drivers, 4700 Pounds; Total Engine, 14000 Pounds; Tender, loaded, 6300 Pounds; Total Engine and Tender, 20300 Pounds in Working Order. Heating Surface: Flues 56 square feet, Fire Box 23 square feet, Total 79 square feet. Tractive Power 825 Pounds, (Based on 30% efficiency, practice of that period). Tender Capacity, Water 400 Gallons, Coal 500 Pounds.

IX —"Railway Machinery" by Clark, published in 1855.

X —"History of the First Locomotive in America" by Brown, published in 1874.

XI —"Locomotive Engineering" by Colburn, published in 1871.

XII —"History of the Locomotive Stourbridge Lion" by G. C. Maynard.

XIII —Copy of "Bill of Material" developed by Foster, Rastrick & Company, covering the wheels and axles for the "Stourbridge Lion." The original is now in the Goldsmith Library, London University.

XIV —"Development of the Locomotive Engine" by Sinclair, published in 1907.

XV —"History of the Baldwin Locomotive Works" published in 1903.

XVI —Numerous letters of instruction to Horatio Allen while in England.

XVII—"The Stourbridge Lion" by Penniman, published in 1903.

TENDER

I —"Old Locomotives of the Delaware and Hudson Company and its after Acquired Lines through Stock Ownership and Lease Holds."

II —"Passenger, Freight and Work Equipment on the Delaware and Hudson."

III —"Treatise of The Locomotive" by Wood, published in 1832.

IV —"History of Wayne, Pike and Monroe Counties, Pa." by Mathews, published in 1886.

V —"Practical Treatise on Rail-Roads" by Wood, published in 1838.

VI —Photograph of No. 1 Locomotive of the Stockton and Darlington Railway.

VII —Engraving of the "Stourbridge Lion" by Clark.

VIII —"The Stourbridge Lion," by Penniman, published in 1903.

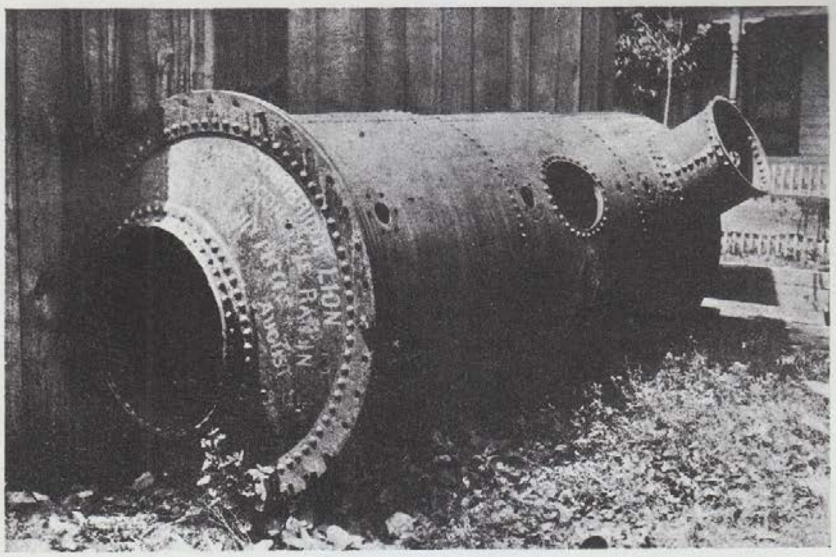
IX —"Coal Mining," by Chance, published in 1883.

X —Blue Prints of early Mine Cars from Hudson Coal Company.

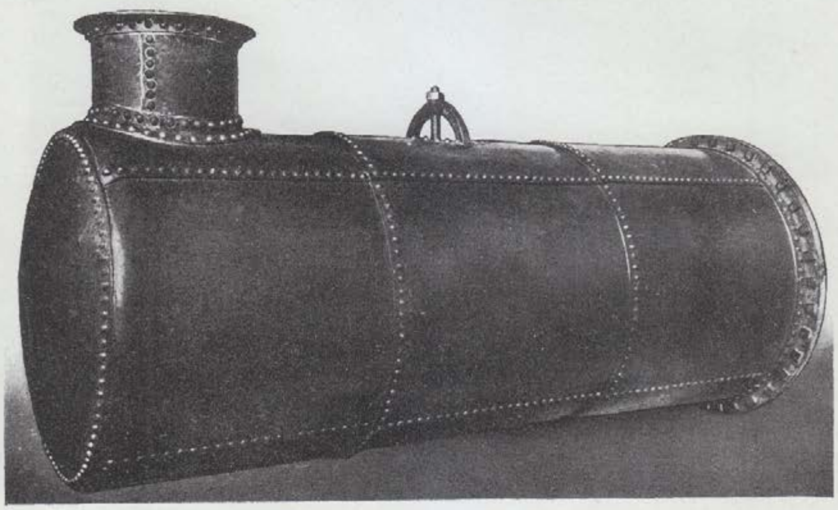
XI —Vouchers included in the Accounts of Engineer Jervis for the year 1829.

BOILER

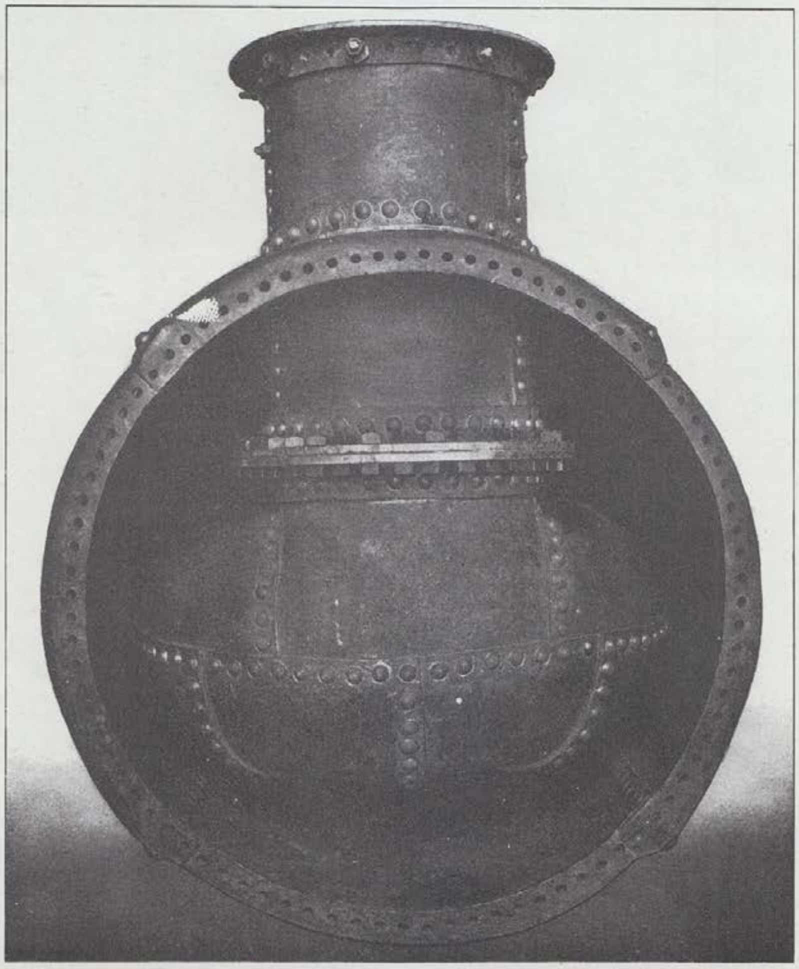
The original boiler is in the Smithsonian Institution, Washington, D. C., placed there June 18, 1890 by Lindsay & Early of Carbondale, Pennsylvania, accession number 23316.

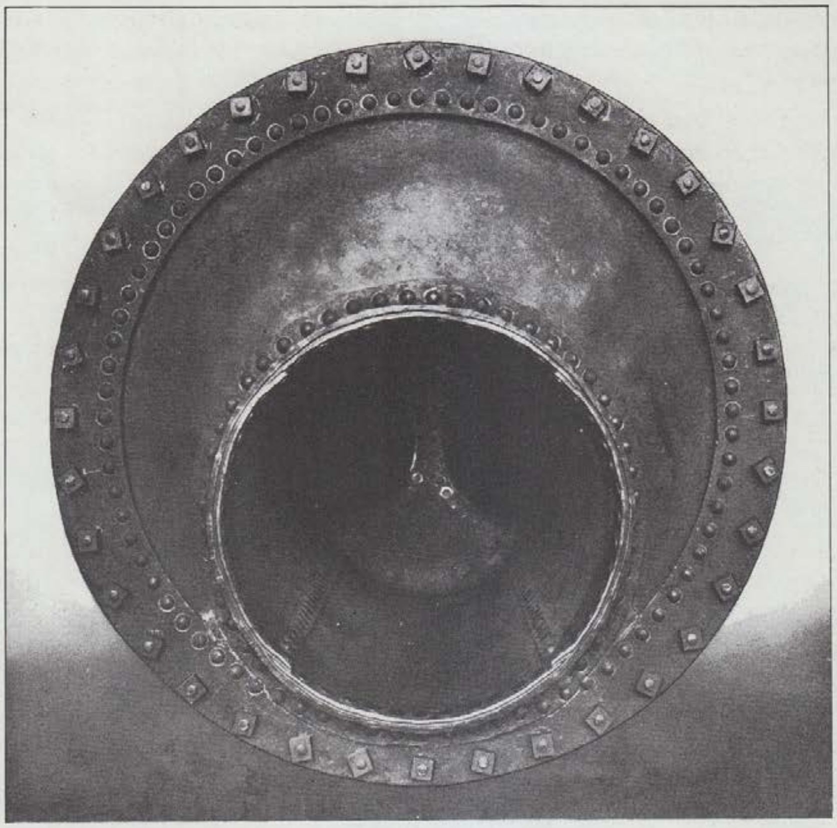


Very accurately and fully detailed drawings of this boiler were made from the original. Such is at once evidenced by the irregular spacing and alignment of the rivets and the variation of the rivet heads both as to size and contour.



The back head, firebox and tubes, can be withdrawn from the boiler as a unit for repairs or cleaning, by removing the bolts in the back head flange and those in the stack extension flange indicating the purpose of the manhole in this boiler was to permit access to this inside stack flange. The design of the cover and holding agent was based on Prof. Renwick's drawing and is the conventional "crab" as still in use today.





There were no studs used in the boiler shell. Instead, for the fastening of parts, square headed bolts, much in the form of our present carriage bolt, with square nuts, was the practice of the period.

Under all bolting flanges a groove was chipped in the boiler shell, within the bolt circle, in which a soft wire was placed to provide a steam tight joint when the flange was drawn down.

IT IS OF SPECIAL INTEREST TO NOTE stress calculations of the boiler and method of construction meet our present day requirements.

Iron sheets were used in the original construction; as such were not available in the replica, steel was substituted.

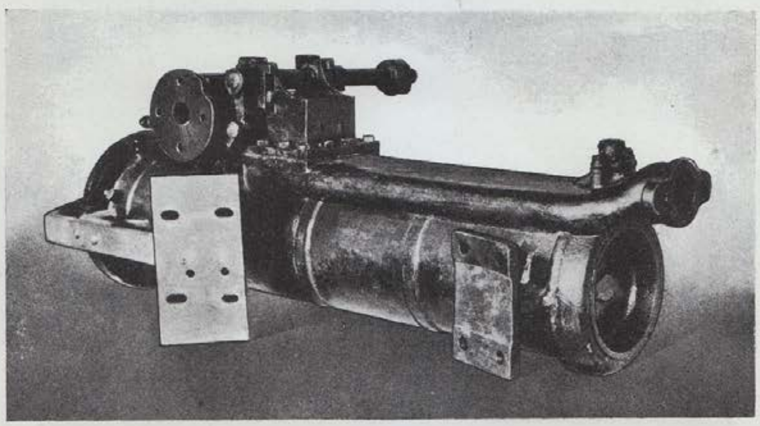
From "The Stourbridge Lion," by Penniman, published in 1903

Quoting: "As its name indicates, it was built at Stourbridge, and Mr. Allen informed the writer hereof that the 'Lion' was suggested by the fancy of the painter, who, finding on the boiler end a circular surface, slightly convex, of nearly four feet diameter, painted on it the head of a lion, in bright colors, covering nearly the entire area."

Our studies indicate the aforesaid Lion was probably of the heraldic type and accordingly the replica was so painted.

CYLINDERS, STEAM CHESTS, AND VALVES

One of the original cylinders is in the Smithsonian Institution placed there by Lindsay & Early, October 15, 1890, accession number 23649.



Similar care was exercised in the making of working drawings for these parts of the replica as obtained with the boiler.

The setting of the cylinders was determined by the location of the holes in the original boiler. The bottom cylinder head depended entirely on a pressure fit and is so arranged on the replica.

The valves were of the flat slide type having outside admission. The valve setting was deduced in the following manner. The difference of the overall length of the slide valve and distance over steam ports was 3/16", which equally divided determined the 3/32" steam lap. The difference between the inside edges of the steam ports and the inside edges of the valves was ⅛",

which equally divided gives a 1/16" exhaust lap. When the valve was on center the clearance between the inside of the steam chest cover and valve stem locking nut was 1-3/32". Therefore, with an allowance of 1/32" clearance maximum travel of the valve upward would be 1-3/32", minus 1/32", or 1-1/16". This 1/32" clearance, considering wear on pins and bearings, and resulting lost motion, was not deemed a safe margin, and for practical purposes a clearance of 3/32" was decided upon. The width of the steam port is ⅞". To totally uncover said ports it is necessary for the valve to have a movement off center of ⅞",—the width of the port plus 3/32" steam lap, or 31/32". Again considering the wear and lost motion condition, it is safe to assume the valve moved more than the required 31/32" to ensure a full port opening at all times. If the movement of the valve was 1" upward from the center, we would have 3/32" clearance as shown above and an overtravel of 1/32". Hence, it was decided to make the valve movement 1" from center position giving a valve travel of 2".

To check the setting of the valves, observation is had by the removal of the two cap screws in the outside wall of the steam chest.

Adjustment in the position of the valve, when found necessary due to erecting variations, was had by resetting locking nut between valve stem and valve yoke.

The operating shaft in the exhibit at the Smithsonian Institution WE BELIEVE IS NOT AN ORIGINAL. To substantiate this

(a) The shaft is so long the operating handle would have been far outside the reach of the engineman.

(b) The operating handle to shaft faces away from the operator.

(c) The cylinder was used as a horizontal stationary engine in the Foundry of Lindsay & Early at Carbondale, and it is reasonable to assume the said shaft, as it now stands, was applied to suit such requirements.

VALVE GEAR, MOTION WORK, ECCENTRICS, ETC.

From catalog of the South Kensington Museum, London, description of "Agenoria"

Quoting: "The slide valves, of the common flat type, are driven by loose eccentrics whose motion is controlled by stops, fixed to the axle, which retain them in the correct positions for forward or backward motion; hand gear is provided for working the valves when reversing, and until the eccentrics attain their positions against the stops."

From "History of the Baldwin Locomotive Works," description of "Old Ironsides"

> Quoting: "The valve motion was at first given by a single loose eccentric for each cylinder, placed on the axle between the crank and the hub of the wheel. On the inside of the eccentric was a half-circular slot running half way around. A stop was fastened to the axle at the arm of the crank, terminating in a pin which projected into the slot. The engine was reversed by changing the position of the eccentric on the axle by a lever operated from the footboard."

From "History of the Gravity Railroad of the Delaware and Hudson Canal Company" by John Torrey

> Quoting: "The valves regulating the passage of steam into and out of the cylinders were operated by rods and cranks connected with eccentrics on the rear axle, working at right angles, one to the other, so that when one piston was at full stroke either up or down, the other would be at half stroke."

From these brief descriptions, coupled with Prof. Renwick's drawing, the "Agenoria" drawings and photographs, and a sketch in Wood's "Practical Treatise on Rail-Roads," the design of the eccentrics and motion work was developed.

This consists of eccentric straps connecting to one arm of a rocker shaft fastened to the under side of the locomotive frame, the other arm connecting vertically to the valve operating shaft. In this vertical connection is the reversing mechanism. It comprises a pin clutch which when disengaged allows the engineman to move the valve to the opposite position. When this condition obtains and the locomotive travels in the reverse direction the eccentrics move away from their stops in the half circular slot and cannot move the valve rigging again until they contact the stops at the opposite end of the slot. When this point is reached the vertical connecting rod moves again to a position where the pin is in alignment with the hole in the clutch, a flat spring forcing same into the hole and the mechanism is again tied together.

WALKING BEAMS

One of the original walking beams is now at the Smithsonian Institution, placed there June 20, 1888 by the Delaware and Hudson Canal Company, accession number 20761.

Our replica holds strictly to the original.

From it we definitely established the crank pin circle. The distance between the front trunnion and the back bearing of this beam is 72½". The distance from the forward trunnion to the main rod bearing is 53⅜", and

since the walking beam fulcrum is at the forward trunnion, the travel of the main rod was 53⅜″ divided by 72½″, or three-quarters of the total travel of the piston located at the rear bearing of the walking beam. The piston travel was 36″, hence, the crank circle must have been three-quarters of 36″ or 27″ The distance from the piston rod bearing to the trunnion at center of the beam was 36¼″ and established the length of the radius bars.

BRACES AND STRUCTURE FOR SUPPORTING THE MOTION OF THE WALKING BEAMS AND PISTONS

From "Catalog of Collections" in the Science Museum, South Kensington, London,

Quoting: "THE 'AGENORIA' LOCOMOTIVE (1829)." ....
"This engine was built by Messrs. Foster, Rastrick & Co., of Stourbridge, for the Shutt End colliery railway at Kingswinford, Staffordshire, which it opened in June, 1829, and afterwards worked over for more than thirty-five years; it is almost identical with the 'Stourbridge Lion,' built by the same firm in 1828, and sent to America, where it was the first locomotive to run upon rails on that continent." ....

"DRAWINGS OF 'AGENORIA' LOCOMOTIVE (1829)." .... "These are dimensioned working drawings of the engine as it now stands."

From these photographs and drawings the design was developed for all of the top structure including such details as the split bushings, straps and taper keys for securing rods to same at all bearing points.

All forgings were hand made on the original and we so fabricated on the replica.

The base of location for most of this structure was developed from the original boiler and cylinders.

MAIN AND CONNECTING RODS

The same sources of information were the bases for development of these parts. It is interesting to note the knuckle pin between the main rod butt end and the connecting rod to take care of the angularity of the main rod. These details are hand forged on the replica.

ENGINE FRAME

Prof. Renwick's drawing was the basis on which this part was designed.

BOILER AND AXLE MOUNTING TO FRAME

The boiler is mounted on the frame by three brackets on each side and stiffened by two braces at the front, all located from the original boiler.

The rear axle was tied to the frame by its housing. At the front axle there is an elliptic spring in place of the frame casting. This spring bears at each end on the under side of the frame and must be free at each end to permit flexibility.

From "Catalog of Collections" in the Science Museum, South Kensington, London,

Quoting: "THE 'AGENORIA' LOCOMOTIVE (1829)." ....
"Springs are fitted to the front axleboxes only, as the action of the vertical connecting rods would have prevented their use over the rear axle."

WHEELS, TIRES AND AXLES

The original tires are in the Smithsonian Institution and were placed there by the Delaware and Hudson Canal Company, June 20, 1888, accession number 20761.

The gauge of the gravity railroad was four feet three inches, therefore the "Stourbridge Lion" must have been the same.

The original tires at Washington are 48" diameter over tread and are 4" wide with a ¾" flange. The thickness of these tires varies from ⅝" to ¾". In the replica these are made ¾" thick with a 1" flange. The change in heighth of the flange was decided upon for safety of operation of the replica.

The retaining rings, also at Washington, for the fellies vary in thickness from ½" to ⅝". On the replica these were made ½". Through these tires and retaining rings are six rivet holes equally spaced. Since one rivet is used to tie the joint of the adjoining fellies tightly against the retaining ring, it was decided there were six fellies with two spokes in each, hence, twelve spokes to each wheel.

IT IS OUR REASONED OPINION THE CIRCULAR IRON BANDS ON THE FACE OF THE WHEELS, BOLTED TO THE SPOKES, NOW ON THE "STOURBRIDGE LION" IN THE SMITHSONIAN INSTITUTION, WASHINGTON, D. C., AND QUITE GENERALLY SHOWN ON CUTS FROM TIME TO TIME, DO NOT BELONG ON THE "STOURBRIDGE LION." Our reasons are

(a) This design was not typical of Foster, Rastrick & Co., but was used by Stephenson.

The Science Museum,
South Kensington,
London, S.W.7.
1/6/27

L. F. Loree Esq.

Dear Mr. Loree,

A short while ago a Mr. Edwards of the Motive Power Dept. of the Delaware & Hudson R.R. Co, called on me relative to the reconstruction of the "Lion" which is contemplated by your company in connection with the Centenary Celebration in Aug 1928.

We supplied him with drawings and photographs of our "Agenoria" but Mr. Edwards was unfortunately unable to make a further call on me.

I send, herewith, for transmission to Mr. Edwards, a note found amongst Rastrick's papers which appears to refer to locomotive wheels he was making or had made, presumably for the 3 American engines or for "Agenoria".

This note may be of use in the reconstruction of the wheels, and would certainly support the Washington story that the ironwork of the wheels now shown with the engine really belonged to the "America".

Trusting this information may be of some use.

I remain

Yours truly

E. A. Forward.

Treasurer
Newcomen Society.

Notes written on a letter dated Nov 1826, amongst the Rastrick Papers in the Goldsmiths' Library, London University

1 axle tree	$1^{c}.3^{qr}.7^{lb}$ @ 84/-	7.12.3
2 pins for do.	4½ @ 84/-	3.5
8 Steel keys for do	2 @ 112/-	2.0
Fitting on the wheels & Cutting the cotter holes.		1.0.0
6 Felleys @ 3/6		1.1.0
12 spokes @ 1/4		16.8
Making the wheel		1.10.0
1 Cast iron centre piece	3.16 @ 18/-	15.11
1 Wrot iron arm	1.5¼ @ 1/-	1.13.3
Fitting do		1.10.0
Files &c		5.0
Key for do		6
1 Wt iron tyre 1.3.22 @ 42/-		4.1.9
Fitting on tyre		10.0
Cutting 6 holes and rivetting		4.0
6 rivets & washers	3¼ @ 56/-	1.8
Turning 1 wheel		1.0.6

An undated loose slip gives the following.

Axletree for locomotive engine		$1^{c}.3^{qr}.7^{lb}$
1 pin for do		2¼
1 Hoop for wheel	do	1.3.21
6 pins & Washers	do	3¼
4 steel Keys for	do	1
1 wrought iron arm for the wheel		1.3¼
1 Cast iron Knoff ?		3.6

P.T.O.

Notes on above.

<u>Revolving pin</u> was Rastrick's term for crank pin.

<u>Pin</u> sometimes means rivet or screw in Rastrick's writings.

<u>Hoop</u> corresponds with <u>Tyre</u>.

The <u>6 pins & washers</u> are the rivets fastening the tyre to the wooden rim of wheel.

The crank pin was evidently carried on an iron arm extending from centre to rim or right across a diameter, and not on iron rings as shown in Newcomen Society "Lion" drawing. This arrangement was used by Stephensons in 1830.

(b) Foster, Rastrick & Company's bill of material for wheels and axles does not mention any such bands.

(c) Prof. Renwick's drawings made from actual measurements while the "Stourbridge Lion" was standing off the track at Honesdale, Pennsylvania, 1829 does not show such bands.

(d) The crank pin circle of these bands is 24½" while we have definitely established such as 27" on the "Stourbridge Lion."

In the Foster, Rastrick & Co. bill of material (cut of original given) we find listed:

"1 Cast iron centre piece 3.16" .... which translated is three-quarters of one hundred weight plus sixteen pounds, or a total of ninety-one pounds.
"1 Wrot iron arm 1.5¼" .... which translated is thirty and one-quarter pounds.

It was felt these items must be the hub and one metal spoke for the crank pin. On the replica this hub and spoke is an integral casting.

IT IS INTERESTING TO NOTE THE PROPORTIONS AS DECIDED UPON FOR THE HUB AND SPOKE, BY SCALING PROF. RENWICK'S DRAWING, GAVE A FINISHED WEIGHT VERY CLOSE INDEED TO THE ABOVE FIGURES.

On this replica the crank pins were pressed through the iron arm and fastened by a nut on the inside.

From "History of the Gravity Railroad of the Delaware and Hudson Canal Company" by John Torrey

Quoting: "The hubs of the wheels were of iron, and were so fastened to the axles that they could not revolve without the axles revolving with them."

COUNTERBALANCE

Much dispute is had whether or no the main wheel of the "Stourbridge Lion" was counterbalanced.

FOR THE NEGATIVE SIDE THE FOLLOWING IS FAVORABLE:

From "Development of the Locomotive Engine" by Sinclair, published 1907,

Quoting: "Counterbalancing the driving wheels," .... "........... was not tried in England until 1839, several years after it had been successfully carried out in the United States."

From "Locomotive Engineering" by Colburn, published 1871

Quoting: "The remaining improvement effected, in 1837, in the Locomotive engine, was the introduction of counterweights in the driving wheels."

In 1837 Mr. Rogers of Rogers Locomotive Works filed a specification described as follows:

Quoting: "The nature of my improvement consists in providing the section of the wheel opposite to the crank with sufficient weight to counterbalance the crank and connecting-rods, ..."

From "Railway Machinery" by Clark, published in 1855,

Quoting: "In 1838 he (Mr. George Heaton) experimented with a model of a railway-carriage wheels and axle ...." "........... He classed the driving wheels and axles of locomotives, with their revolving appendages, as unbalanced wheels; and proposed to apply counterweights to the wheels, between the spokes, to balance the revolving màsses, ..."

FOR THE POSITIVE SIDE THE FOLLOWING ARGUMENTS ARE PRESENTED:

Prof. Renwick's drawing made to scale from careful measurements of the "Stourbridge Lion," when the locomotive was at Honesdale in 1829 and later appearing in his book "Treatise on the Steam Engine" published in 1830, clearly shows counterbalance on the main wheel. It is hardly probable anyone would add such weight if it was not on the locomotive without mentioning it. Was Prof. Renwick years ahead of the locomotive builders in a realization of the need of counterbalancing and so showed it? Was it a mere coincidence in the event there was no balance, that he should show balance only on the main wheels? It is more than a mere coincidence that a counterbalance as scaled from Prof. Renwick's drawing and applied to this replica does balance approximately fifty percent of the revolving and reciprocating weights.

From "History of the First Locomotive in America" by Brown, published in 1874,

Quoting: "Annexed we give a sketch of the 'Stourbridge Lion' from an original drawing of the machine, ..."

THIS SKETCH SHOWS COUNTERBALANCE.

From "Practical Treatise on the Rail-Roads" by Wood, published in 1838, we find that in the early part of 1829 Mr. Rastrick and Mr. Walker made a number of experiments while pursuing their inquiries as to the moving power to be adopted by the Liverpool and Manchester Railway. Mr. Wood,

the author of this book was closely associated with Mr. Rastrick and describes results of some experiments made pertaining to the amount of effective adhesion of drivers as follows

Quoting: "...........We had frequent opportunities of observing this; and some experiments, which were made, proved the fact beyond any doubt. The following experiments, made with Messrs. Walker and Rastrick, while pursuing their inquiries, as to the moving power to be adopted upon the Liverpool and Manchester Railway, will, perhaps, shew this very clearly; and which corroborated other experiments we (meaning Wood and Rastrick) had made for the same purpose."

Evidently this must have been before the early part of 1829, because Mr. Wood states "WE HAD MADE." In conjunction with his description of these experiments, Mr. Wood makes the following statement

Quoting: "The action of the power of the cylinders upon each of the wheels of the engine," .... is extremely irregular; when the piston, for instance, is at the top of one of the cylinders, say No. I, the power has no effect in turning the wheels round, and the circumvolution is effected by the other cylinder, No II, through the connecting rod on each side of the wheels, pushing the pair of wheels, No. I, round. When, however, the crank on the wheels, No. I, has arrived at a certain period of its revolution, the action of the cylinder, No. I, gradually becomes greater, then equal to No. II, and then the predominant moving power, when the other pair of wheels, No. II, is dragged round by the action of the cylinder, No. I: each pair of which is thus alternately pushed, and dragged forward, by the action of the pistons, and the connecting rods;" .... "such interchanges, in the intensity of the action of their forces, induce, at certain intervals, a slipping of the wheels. The weight of the pistons, and their connecting rods, also, are not balanced; and which, by producing an irregularity in the pressure on the rails, has the effect, also, of inducing a slipping on the descending, rather than on the returning, stroke; ...."

THIS INDICATES THAT MR. RASTRICK, WHO WAS THEN BUILDING THE "STOURBRIDGE LION," HAD PRIOR TO 1829 A KNOWLEDGE OF THE NEED OF A COMPENSATING AGENT WHICH RESULTED IN COUNTERBALANCE.

From "The Steam Engine" by Tredgold, published in 1827,

Quoting: "There will, I think, be some advantage in making the pistons act together, because the effect will be as great as by dividing it, supposing both methods to be perfect; and in acting together there would be less interference of the motion of the one with that of the other."

The replica as built has counterbalance in the main drivers.

From "History of the Gravity Railroad of the Delaware and Hudson Canal Company," by John Torrey.

Quoting: "The spokes and felloes were of oak wood, and were painted a bright red."

FEED WATER PUMP AND OPERATING MECHANISM

The feed water pump is on the left side of the boiler actuated by a rod driven by the walking beam. The amount of water pumped is controlled by regulating the length of the stroke, which is very clearly shown on the cuts.

Between the pump and the boiler is a large shutoff cock which permits work being done on pump, valves or piston while boiler is under steam.

The pump consists of a vertical cylinder, open at the top. The bottom of the cylinder opens into a rectangular chamber, in one end of which is located the suction valve, and in the other, the discharge valve. The valves are of the weight type with tapered seats movement being had whenever suction or pressure is applied to their heads. At the end of each stroke there is a momentary period when the suction action is changed to a pressure or discharge action and vice versa. During this brief changeover, the intake valve will close itself due to its weight and will be held there by the pressure of the water in the cylinder and chamber, which also raises the discharge valve and forces the water into the boiler. At the changeover from discharge to suction, the discharge valve is seated by gravity and is held closed by the boiler pressure. Since the upward action of the pump with both valves closed would create a vacuum, the suction action lifts the intake valve and permits the pump to raise the water from the preheater to await another reversal of motion. A capacity test of the pump was made developing it was capable of delivering thirty percent above cylinder requirements at five miles per hour.

By disconnecting the operating rod and operating the lever by hand, water can be supplied to the locomotive while standing if found necessary.

THROTTLE, THROTTLE VALVE, AND STEAM PIPES

The throttle was at the rear on top of the boiler, the throttle lever being within easy reach of the engineman, exact location had from original boiler. We find from references the throttle was in part a tee shaped casting, one leg of which went to the boiler and one to each steam pipe, thence to the steam chest. At right angles through this tee the casting housed the valve.

FEED WATER HEATER

From Mr. Rastrick's letter dated June 13, 1829 to W. & J. Brown & Co., London, in explanation of the delay in forwarding the last of the three locomotives contracted for by Mr. Horatio Allen, we find

Quoting: "........... I have made some very important additions and improvements" .... "and when I have wrote Mr. Allen, from whom I have had a letter and send him the drawings and details, I know he will feel I have done everything for their advantages, and that the delay of a few months will be amply compensated for by the improvements of the engines. I will send the whole off in ten days."

These improvements consisted in part of a feed water heater fitted up with pipes, etc.

From "History of the Gravity Railroad of the Delaware and Hudson Canal Company," by John Torrey,

Quoting: "The railroad, however, was not quite ready for the trial (of the locomotive upon it) and Mr. Allen occupied a few days in having some improvements made. He employed a worker in sheet iron to construct a small water holder to be placed under the boiler, from which the boiler was to be supplied, instead of obtaining such supply direct from the tank of the tender."

Prof. Renwick's drawing shows such a heater was applied to the "Stourbridge Lion," hence, to replica.

SAFETY VALVES

Two safety valves were applied located from the original boiler. One valve of weight and lever type functioned as internal pressure overcame the load applied to the valve. Variation of relieving pressure was made by the movement of the weight along the lever. The design of the valve applied was developed from Prof. Renwick's drawing, which very carefully details the structure. The lever which carried the weight was limited in its movement by guides regulating the maximum open position. This valve is located just back of the manhole on top of the boiler.

From "History of the Gravity Railroad of the Delaware and Hudson Canal Company," by John Torrey

Quoting: "The boiler had two 'safety valves' one of which was placed in rear of the centre of the top of the boiler, where the engineer could have ready access to it, and the other was placed very near to, and in rear of the chimney and was so covered by a small dome as not to be easily accessible."

Also from the same book by John Torrey

Quoting: "In 1829, the Liverpool and Manchester Railroad Company offered 'a prize of 500 pounds for the best locomotive' for their road, and one of the specifications was 'The boiler must have two safety valves, neither of which must be fastened down, and one of them must be completely out of the control of the engineer'."

This explains the presence of a small dome directly in back of the stack.

While we were able to develop in old volumes data to enable us to build this type of a safety valve, probably a spring loaded type, as a precaution in this location we applied a standard present day safety valve. The dome covering, however, is as outlined in Prof. Renwick's drawing.

GRATES, BACK HEAD, FIRE DOOR ARRANGEMENT, ASH HOPPER, ETC.

From the designs of the "Agenoria" and the drawing by Prof. Renwick, sufficient information was available to accurately provide these parts.

STACK

The heighth over stack of the "Agenoria" is twenty-one feet five inches. From the "Catalog of Collections" in the Science Museum, South Kensington, describing the "Agenoria" we find

Quoting: "The exhaust steam is turned into the chimney, but, from the exceptional height of the latter, it is probable that this blast was not utilised to increase the draught; at the time the engine was built, great objections were raised to the noise of locomotives, and also to the smoke given off; these annoyances would be reduced by a quiet exhaust and a tall chimney."

From letter of instruction to Mr. Horatio Allen from Mr. J. B. Jervis, dated January 16, 1828,

Quoting: "It is supposed anthracite coal does not require so high a chimney as other fuel, but I am not possessed of any particular facts on this subject; I presume you can have the chimney so constructed that an additional piece may be attached, if it is found on trial to require it."

The stack on the replica was provided with a flange at the top to receive such additional piece, and from scaling and descriptions we were led to believe the heighth from rail to top was fifteen feet and the replica was so constructed.

TENDER

From "Old Locomotives of the Delaware and Hudson Company and its after. Acquired Lines Through Stock Ownership and Lease Holds" we have

Quoting: "At Honesdale a tender was added to her, one of the coal wagons (as the cars were then known) being utilized for that purpose. She was first tried out on August 8, 1829..........."

From "Passenger, Freight and Work Equipment on the Delaware and Hudson"

Quoting: "According to journal entries posted in 1829, seventy 'wagons' were purchased from the West Point Foundry ...."
"........... This early type of coal car appears to have had a carrying capacity of about one and one-half to two tons. The box or body was of wood construction. The wheels, of which there were four, one pair at each end, were cast iron of spoke design."

From "Treatise of The Locomotive" by Wood, published in 1832, we have this description by Mr. James Archbald to Mr. Wood, in his article on the original plans of the gravity railroad,

Quoting: "Weight of wagon 1 ton; ditto of load 2-½ tons; wheels 3 feet diameter; axles 2-¼ inches; one loose wheel on each axle."

In the history of Wayne, Pike and Monroe Counties, Pennsylvania, by Mathews, published by Peck & Co. in 1886, we find an account of the "Stourbridge Lion" and its initial run. This account was founded on an article which appeared in the Honesdale Citizen in 1881 and was written on information received from Mr. Allen and authoratively endorsed by him when completed. In this account is an engraving showing the "Stourbridge Lion" and tender. The tender shows curved spoke wheels. With the replica the curved spokes were made of flat wrought iron, placed in the mould and cast in the hub.

In the references consulted the wheels all showed ten spokes. This may be a mere coincidence or typical of the design of the period.

From "Practical Treatise on Railroads" by Wood, published in 1838

Quoting: "Fig. 4, Plate VII shews an improved plan of this kind of bearing, which is much used, for carriages." ...."Until recently the lower side of the axle was exposed, and the dust of the railroad operated very injuriously to the progress of the carriages..........."

We designed our wheels, axles, and axle bearings from these descriptions.

The superstructure of the tender was made to suit the capacity as outlined by Mr. Jervis. Scaling the engraving by Mr. Clark, it was found a tender built to such dimensions would have the specified capacity. From prints obtained from the Hudson Coal Co., Scranton, Pennsylvania, several sizes of lumber used were determined, such representing the earliest type of mine "waggons."

From "Coal Mining" by Chance, published in 1883, the coupling arrangement, consisting of a round iron eyebolt so arranged same extended through the end sill and crossbearer, and so prevented from pulling out by tapered keys driven through the bolt and drawn tight against the end sill and crossbearer.

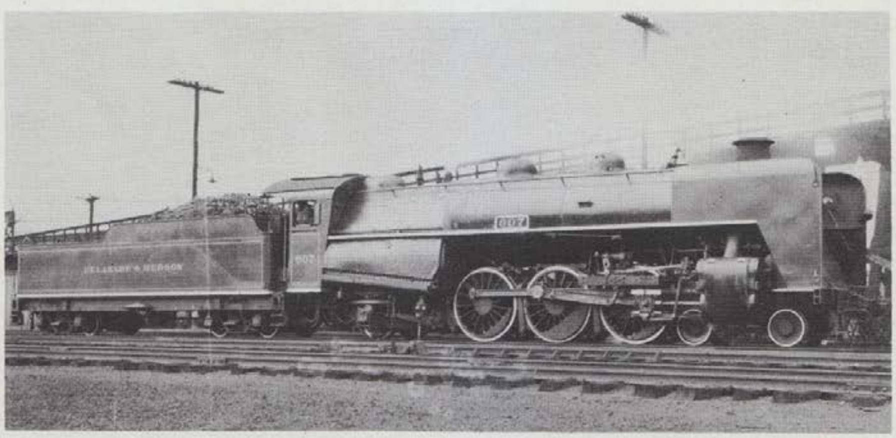
This car also had metal bands around the end of the side sills to prevent same splitting.

The draw gear between engine and tender was developed from Clark's engraving. It is a long pin applied from the top of the tender deck which passes through the end sill, through the coupling link of the engine and the eyebolt of the tender.

The cistern has a capacity of four hundred gallons and is based on Clark's engraving.

The feed water line is a leather pipe connecting the tender to the feed water heater, assuring flexibility between engine and tender. Reference to this leather pipe was found among vouchers included in the Accounts of Chief Engineer Jervis for 1829

Quoting: "............Aug. 1, one leather pipe for locomotive engine"
.... "painting waggon for locomotive tender $2.50,
..........."



Locomotive 607 equipped with smoke deflectors.

50. 1946-1947:

E. D. LeRoy wrote a 7-part article on the D&H. That article was originally published in the *Department of Internal Affairs Bulletin.*

Part Four of that article was reprinted in the *Carbondale News* of August 23, 1946 under the title "Writes of 'Lion's' Epic-Making Trip from Honesdale". Therein we read:

"Henry Stephenson, the pioneer railroad builder, was unable to accept the order for all four engines ordered for the Delaware and Hudson Gravity Railroad but agreed to build one. Foster, Rastic and Co., of Stourbridge, agreed to build three. All four of these engines arrived in New York during the summer of 1829. There is reasonable assurance that the name 'America' was given to Stephenson's engine and that the names 'Delaware' and 'Hudson' were given two of those manufactured by Foster, & Rastic, but the only certainty is the name of the fourth; it was the 'Lion' or more commonly the 'Stourbridge Lion,' so called because of the Lion's head painted on the front of its boiler. / On May 27, 1829, the 'Lion' was set up on blocks in the foundry of Abeel & Dunscomb and operated under its own steam for Philip Hone and a selected group of men. The following day another of the locomotives was set up in another foundry and worked equally well but from there on we can follow only the 'Lion' for complete mystery surrounds the fate of the other three, although there seems to be reasonable assurance that all four were taken to Rondout where the 'Lion,' and some say the 'America,' were loaded on board the canal boat 'Congress' for the voyage to Honesdale. If the 'America' began the trip it certainly did not reach Honesdale with the 'Lion.' / Possibly the 'America' was removed at some point along the canal (Hawley has been mentioned, but with no assurance). In any event, on July 20, 1829, Mr. Jervis wrote to President Bolton that the 'Lion' would reach Honesdale on the 22nd. Records show that this famous engine was removed from the 'Congress' on the 24th, and the work of re-assembling begun, but it was not until August 8, 1828, that the 'Lion' started on its epic-making trip. . ."

51. 1948:

In the summer of 1948, the replica of the *Stourbridge Lion,* now on display in the Wayne County Historical Society, was lent to the Railroad Fair in Chicago. The fair, which was held for two months, beginning about July 15, was hosted by the Museum of Science and Industry, Jackson Park, Chicago. Here are five pages of correspondence about this event that are in the archives of the Wayne County Historical Society:

MUSEUM OF SCIENCE AND INDUSTRY
Founded by Julius Rosenwald
Jackson Park - Chicago 37

57th Street and South Shore Dr.

March 15, 1948

Mr. J. H. Nuelle, President
The Delaware & Hudson R. R.,
230 Park Avenue,
New York 17, N. Y.

Dear Mr. Nuelle:

In the Railroad Fair to be held in Chicago this summer, commencing about July 15 and lasting six to eight weeks, the pageant representing historic episodes in the last hundred years of railroading, will be one of the most impressive features.

A considerable amount of old equipment will be required.

Among such in the possession of your road is the Stourbridge Lion.

It will contribute immensely to the success of the Fair if you can make this equipment available. The thought is that every endeavor should be made to restore the equipment, faithful in all details to its original appearance. Some research may be necessary. Of course equipment should be completely operable.

At the same time, the Fair will be glad to consider the inclusion of any other historic equipment which you feel would add to the pageant.

The equipment should be delivered to the Fair grounds at 23rd and the Lake Front over the Illinois spur not later than July 1.

In your reply, in order to plan sequence of movement of the equipment in the various scenes and to provide the right amount of marshalling trackage, the exact overall length of each unit is requested.

Very truly yours,

/s/ L. R. Lohr.

President.

THE DELAWARE AND HUDSON RAILROAD
CORPORATION

OFFICE OF THE PRESIDENT

J. H. NUELLE
PRESIDENT

230 PARK AVENUE, NEW YORK (17) March 22, 1948.

Wayne County Historical Society,
Honesdale, Pa.

Gentlemen:

I am enclosing copy of letter from the Museum of Science and Industry, Chicago, Ill., dated March 15, 1948.

You will please note that they would like to exhibit the "Stourbridge Lion," with other railroad equipment, for a period of six to eight weeks. I am wondering if it would embarrass you if we agreed to loan them the locomotive during the Railroad Fair to be held in Chicago this summer. The locomotive would, of course, be returned to Honesdale after the Fair.

You also have one of the old coaches from the Gravity Railroad and I am wondering if you would care to loan that to the Railroad Fair for the same period?

Before replying to Mr. Lohr's letter, I would like to obtain your reaction.

With kind personal regards, I am,

Sincerely yours,

JHNuelle

President.

Enc.

THE DELAWARE AND HUDSON RAILROAD
CORPORATION

PENNSYLVANIA DIVISION

C. A. MORGAN.
SUPERINTENDENT

CARBONDALE, PA. June 18, 1948

Wayne County Historical Society

Honesdale, Pa.

Attention Mrs. W. K. Newton, Secretary:

Dear Mrs. Newton:

It is the desire of The Delaware and Hudson Railroad Corporation to move the replica of the Stourbridge Lion, now on exhibition at Honesdale, to Chicago for exhibition at the Railroad Fair in that City.

We will arrange with Contractor John Booth, Carbondale, to move the engine from your building to the Erie Railroad Station, Monday, June 21, 1948.

Yours truly

CAMorgan

Superintendent

21 June 1948

Mr. L. H. Lohr, President
Museum of Science and Industry
57th Street and South Shore Drive
Chicago, Illinois

Dear Mr. Lohr:

At the request of Mr. J. H. Nuelle, President of the Delaware and Hudson Railroad, the replica of the STOURBRIDGE LION, first steam locomotive to run in America, is being shipped today from Honesdale where it made its first journey on rails, August 9, 1829, to Chicago via the Erie Railroad.

We trust you will have a very successful Fair and we are pleased that the STOURBRIDGE LION is to be present and take its important part in the Pageant.

Sincerely

Myrtle V. Newton
Secretary

21 June 1948

Mr. Edward Hungerford
c/o Mr. L. R. Lohr, President
Museum of Science and Industry
Jackson Park
Chicago 37, Illinois

Dear Mr. Hungerford:

As per request of Mr. J. H. Nuelle, the replica of the STOURBRIDGE LION which has been housed in a building made for it in Honesdale, is being shipped via the Erie Railroad on its journey to Chicago to take part in the Railroad Fair. Mr. Nuelle said you were to have charge of the railroad exhibit.

With the engine goes a sign as follows:

THE STOURBRIDGE LION
First Steam Locomotive to operate in America.
Made its trial run on the Delaware and Hudson
Gravity Railroad on August 8, 1829, at
Honesdale, Wayne County, Pennsylvania.
Horatio Allen, Engineer.

This sign is painted on cardboard. We do not know whether the engine will be in the open air during the Fair this summer, or housed in a building. If it is in the open air the sign should be painted on wood. If this is the case, would you like us make a new sign or have you made arrangements to take care of it?

We are very glad to have the STOURBRIDGE LION take its place at the Fair and wish you the greatest of success in all your plans for the pageant and everything connected with the Fair.

Sincerely

Myrtle V. Newton
Secretary

52. 1954:

***Stourbridge Lion* 125th Anniversary program:**

On a newspaper clipping in the archives of the Wayne County Historical Society, the poem titled "The Stourbridge Lion" by Will Malia (71 St. James Terrace, Yonkers, NY) is presented. With that poem is the following "Editor's Note":

"The Wayne County Historical Society has started to publicize the 125th anniversary of the running of the Stourbridge Lion, the first locomotive to turn a wheel by steam on [sic] the Western Hemisphere. This historic event took place at Honesdale, Pa., August 8, 1829. At first meeting held, November 30, called by and presided over by Mrs. Vera Keen, president of the Historical Society, committees were appointed to work out a week's program, starting August 2 and extending to August 7, 1954. It will consist of a historical display, parade, tableaux, floats, entertainment, dancing and other affiliated diversions."

Here is the flyer that was produced about the 1954 *Stourbridge Lion* celebration events:

— — 125TH ANNIVERSARY — —

Stourbridge Lion Celebration

HONESDALE, WAYNE COUNTY, PENNSYLVANIA

AUGUST 3rd to AUGUST 8th, 1954

TUESDAY, AUGUST 3rd —

7:00 P. M. Parade and Grand Opening of Home Coming Week.

8:00 P. M. Historical Show at the Armory.

WEDNESDAY and THURSDAY, AUGUST 4th - 5th —

Historical Show at the Armory, 2:00 to 5:00 P. M. and 7:00 to 11:00 P. M.

FRIDAY, AUGUST 6th —

Shopping and Visiting Day.

SATURDAY, AUGUST 7th —

2:30 P. M. Ball Game at the Stourbridge Grounds.

8:30 P. M. Historic Costume Dance at the Armory.
Come in Costume, High Hat, or Blue Jeans. Prizes.

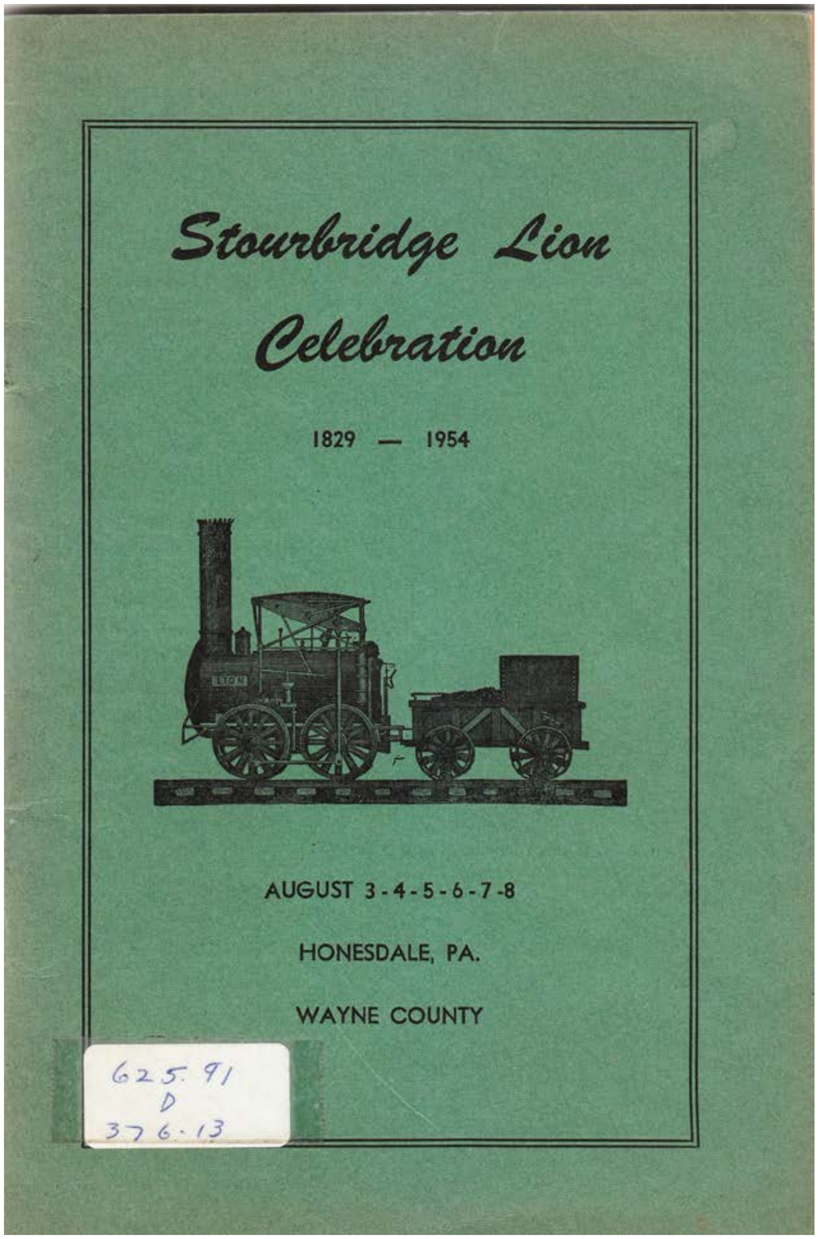
SUNDAY, AUGUST 8th —

Anniversary Concert with Professor Bly's Symphonic Strings, Opera Star Gallicampi, Mass Chorus of Wayne County at the Stourbridge Grounds.

BLOCK PARTY TUESDAY, WEDNESDAY AND THURSDAY EVENINGS.
MINIATURE CIRCUS AND "CHOO-CHOO" RIDES FOR CHILDREN.
PLENTY TO EAT AND DRINK.

On Route 6. **Come and Meet Your Friends.**

Here is the *Stourbridge Lion* Celebration commemorative booklet that was produced in 1954:



HONESDALE, PA.

County Seat of Wayne, named for "Mad Anthony" Wayne, a General of the Revolutionary War. Known as Maple City, because of thousands of maple trees arching and shading 25 miles of hard-surfaced streets.

HORATIO ALLEN was the first steam locomotive engineer, who manned the Stourbridge Lion on its first trip.

Honesdale has the distinction of being the place where the First Locomotive on the American Continent, "The Stourbridge Lion," made its initial trip, August 8, 1829, on the Delaware and Hudson Canal Company Railroad.

The Wayne County Historical Society has built a special building, on the original roadbed, to house a replica of this historical engine.

For Health, Pleasure or Profit, Come to Honesdale.

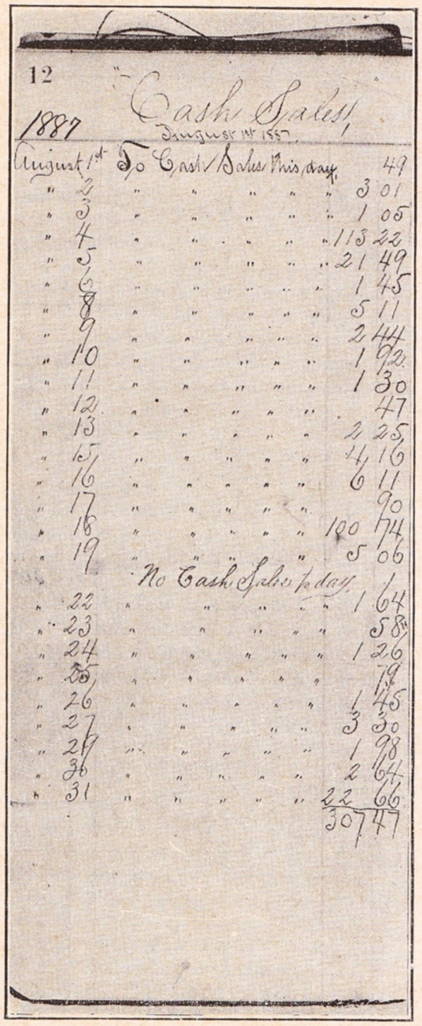
Write for information to

SECRETARY OF CHAMBER OF COMMERCE

HONESDALE, PA.

From One Old-Timer To Another . . .

BEST WISHES FOR A SUCCESSFUL 125th CELEBRATION!



12

Cash Sales, 1887

August 1st 1887

August	1st	To Cash Sales this day	49
"	2	" " " " "	3 01
"	3	" " " " "	1 05
"	4	" " " " "	113 22
"	5	" " " " "	21 49
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"	9	" " " " "	2 44
"	10	" " " " "	1 92
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"	13	" " " " "	2 25
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"	17	" " " " "	90
"	18	" " " " "	100 74
"	19	" " " " "	5 06
		No Cash Sales to day	
"	22	" " " " "	1 64
"	23	" " " " "	58
"	24	" " " " "	1 26
"	25	" " " " "	79
"	26	" " " " "	1 45
"	27	" " " " "	3 30
"	29	" " " " "	1 98
"	30	" " " " "	2 64
"	31	" " " " "	22 66
			307 47

Sales Record of P. R. Murray in August of 1887 Tells Its Own Story.

Yes, it's been a long time since Horatio Allen made his historical trip. It's also a long time (126 years) since Capt. Ed. Murray started selling supplies to his fellow canalers.

Since both of these events, Wayne County, Honesdale, and Murray's have grown up together. As shown at left in P. R. Murray's Sales Record of 1887, things were not always rosy.

Floods, Fires, Wars and Depressions at various times helped everyone realize and appreciate their everyday blessings that are a part of the friendly County of Wayne.

"Though The Pathfinders Die . . .
The Paths Remain Open."

MURRAY CO. INC.

Serving Wayne County Since 1828

2

Schedule of Events

August 3rd — August 8th

Aug. 3rd—PARADE AND GRAND OPENING OF HOME-COMING WEEK.

Parade will feature the trial run of the Stourbridge Lion with attending Indians, early settlers, bands, past modes of travel, etc.

HISTORICAL MUSEUM AT THE ARMORY.

Indian Exhibit, Model 1829 Kitchen, Coins, Old Gun and Sword Display, Models of Canal Boats, Historic Documents, Weaving and Spinning Wheels, Historic Cosutmes, Glass Cutter and Cut Glass and other historic features. Entertainment, 1829 and modern.

Aug. 4th—MUSEUM. Open 2:00-5:00 and 7:00-11:00 P.M.

AMUSEMENTS. Armory and Main St.

CHOO-CHOO RIDES for young and old.

BASE-BALL GAME.

Aug. 5th—MUSEUM. Open 2:00-5:00 and 7:00-11:00 P.M.
AMUSEMENTS.

BLOCK PARTY.

Aug. 6th—SHOPPING AND VISITING DAY FOR HOME-COMERS.

AMUSEMENTS.

Aug. 7th—GRAND COSTUME BALL.

Come in costume, high hat or blue jeans. Also costumes representing the countries of early settlers—England, Ireland, Scotland, Germany, etc.

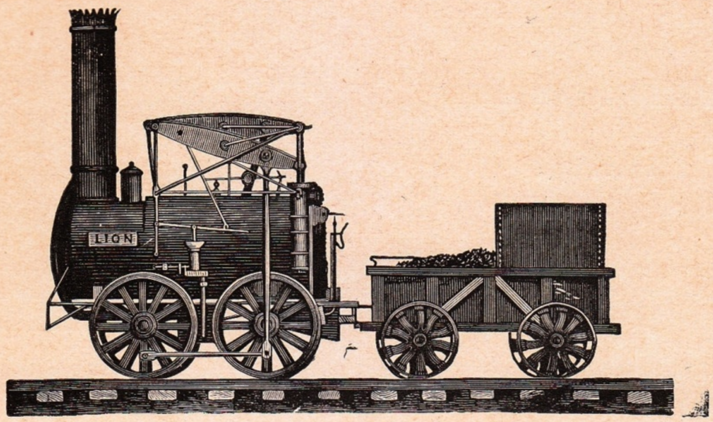
Contests in old-fashioned square and round dances.

Aug. 8th—MUSICAL CONCERT.

Band, chorus and special artists.

Combined choirs of Wayne Co.

Stourbridge Lion



In ~~1928~~ 1829 Horatio Allen, engineer of the Delaware and Hudson Co., was sent to England to have four locomotives built under his supervision. He was to decide whether they should have four or six wheels and other details of construction.

At this time coal was carried over the Moosic mountains from Carbondale by means of a Gravity Railroad. No steam locomotive had ever turned a wheel or run on any track in the United States.

The Stourbridge Lion, one of the four locomotives brought from England was shipped, via canal, to Honesdale.

On August 8, 1829, Horatio Allen, a young engineer, 27 years of age, alone, drove the Stourbridge Lion upon an epoch-making round-trip, partly over a curved trestle thirty feet high, three miles into the woods of Pennsylvania, to the present site of Seelyville. He returned to the starting point by reversing his engine. He subsequently said that, before the locomotive ran, the general opinion of the lookers-on was that either the road would break down under the weight or, if the curve was reached in safety, the locomotive would not follow it upon the track. Also a drop from the thirty foot high trestle was feared. Allen decided to ride alone in order not to expose life or limb of more than one person to any danger that might actually exist.

The wooden rails were found to be inadequate to sustain the

weight and thrust of the locomotive and the managers of the company found it necessary to abandone the use of locomotives upon this railroad.

CONSTRUCTION

The Stourbridge Lion was manufactured in Stourbridge, England, in 1828 by Foster, Fastrick and Co. under the supervision of Horatio Allen. The locomotive had no headlight, bell nor whistle. It was made with grates for burning anthracite coal, the production of which instigate the building of the D. & H. Canal and opened new vistas of progress in this section.

The "Lion" was suggested by a painter who, finding a suitable surface on the boiler head, painted on it the head of a ilon in bright colors.

The Stourbridge Lion weighed eight (8) tons.

TRACK

The honor of building the first mile of railroad track in America goes to John Raymond, a native of Walton, New York. The road was built of timber in long lengths and topped with strap rails. The wood was not well seasoned and John Raymond had no modern equipment to test the efficiency and accuracy of the road. The wonder of those days is how much was done with so little means. John Raymond's accomplishment is a significant part of railroad history.

The original Stourbridge Lion was finally taken by the U. S. Government to the Smithsonian Institution at Washington, D. C.

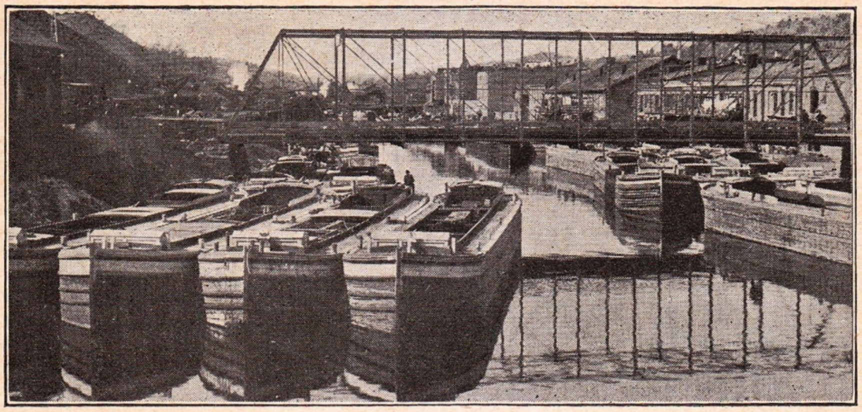
The replica of the "Lion" which figured prominently in "Transportation on Parade" at the New York World's Fair—1939-40, and later was exhibited at Chicago, is now in a specially constructed building on U. S. Route 6, Honesdale, Pa.

A pioneer passenger car of the D. & H. Gravity Railroad is exhibited with the "Lion."

The structure housing the Stourbridge Lion stands on the site of the survey traversed by the original Stourbridge Lion.

The engine and car are preserved for posterity by the Wayne County Historical Society.

"Black Diamonds"



Prior to the War of 1812 the United States imported bituminous coal from England as our vast coal fields were unknown. There is a tradition that some Indians in Pennsylvania knew that the black stones would burn and old records tell of some "arks" of coal being sent down the Susquehanna in 1776 and used by the Proprietary Government in the arsenal at Carlisle to manufacture arms. Some few blacksmiths in the Wyoming Valley had found the "stone coal" useful.

In 1814 Wm. and Maurice Wurtz began to explore the hills and streams of Pennsylvania and discovered the great Anthracite coal deposits about Carbondale. They conceived the idea of hauling the coal over the mountains and canalizing the Lackawaxen in order to transport the coal, via Hudson River to tide water.

The Delaware and Hudson Canal Co. took over the interests of the Wurtz brothers and under the direction of Mr. Wright, engineer of the Erie Canal, ground was broken for the Delaware and Hudson Canal in 1825.

D. & H. CANAL

The Delaware and Hudson Canal was 108 miles long. It was carried across four rivers, had 109 locks and was spanned by 137 bridges. Coal was hauled over the mountain by sled and wagon and loaden on boats at Honesdale. The first canal boats carried twenty-five tons each, but later boats carried from 125 to 150 tons each.

The first coal passed through the Canal in November, 1828.

As the fleet of coal-laden craft glided slowly eastward through the quiet waters of this new channel of inland transportation, toasts

were drunk by the captains of the boaats. We record one to the D. and H. Co.

"Vast and important is the work by these begun
May they still prosper till with joy they see it done."

A complete "History of the D. and H. Canal," written by Edwin Leroy, is available from the Wayne Historical Society.

DOCUMENTARY

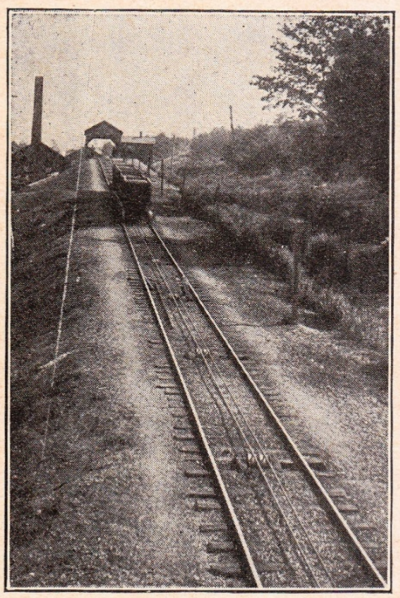
The Encyclopedia Britannica, Vol. XX, page 253 says:

"Three locomotives were imported from England in 1828, and the first trial run in America took place August 8, 1829 at Honesdale, Pa.

John E. Watkins of the Smithsonian Institution, Washington, D. C., stated in an historical address:

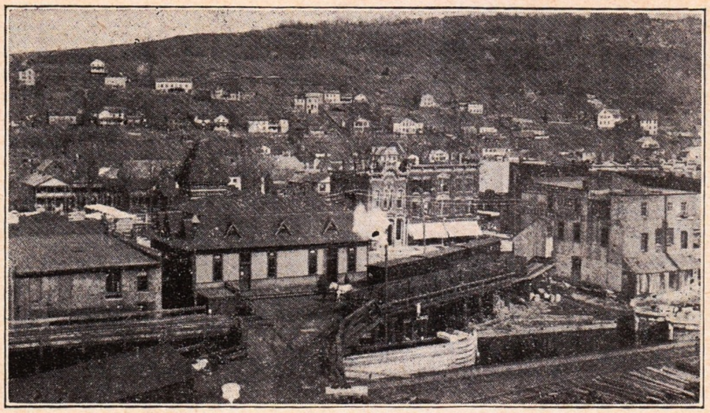
> "Early in 1829 the Stourbridge Lion was ordered from England. Arriving here in August, it made it's first trip under Horatio Allen."

Further documentary evidence has been given by Scribner's Magazine in an article by M. N. Florey; by Baltimore and Ohio Railroad in a book published in 1897; by the New National Encyclopedia; Appleton's New American Cyclopedia; Scientific American of December 13, 1902; Six Thousand Years of History, Pioneer Locomotives in England and America, and many other historic publications.



Gravity Railroad Plane out of Carbondale, Pa.

The Gravity-Railroad



The Gravity-Railroad was recommended by Benjamin Wright as a more feasible means of hauling coal over the Moosic Mountains.

The "Honesdale Gravity" was sixteen miles long, extending from Carbondale to Honesdale. Starting from the coal fields of Carbondale, an elevation of 1,2000 ft., the "Gravity" rose to 1,907 ft. at Rix's gap by means of five planes. From this elevation the road descended on the east side of the Moosic Mountains by three planes and levels to Honesdale, elevation 985 ft.

Stationary steam engines operated the cars on each plane by means of two drums and a huge chain. On the three planes descending to Honesdale the loaded cars required no motive power. Here a braking system was provided. The chains were not practical and were soon discarded in favor of hemp cables. These cables were seven and one-half inches in circumference and presented difficulties by slipping. They were finally replaced by the first steel cables made by John Roebeling.

There were passenger cars on the Gravity entirely open; similar to a flat car with a roof; the seats were long benches across the car. However, there was no dust nor cinders and the scenery and mountain air were exhilirating and inspiring.

When the cars started from Honesdale, a large grey horse pulled the cars to the foot of the plane where the cables were attachd for the first ascent. There was all the thrill of a first airplane ride.

The power on the levels between the planes was truly horse power. After pulling a car along the level, "old Dobbin" rode back in an "empty." The horses grown old in this service always refused to walk the return trip.

Hawley, Wayne Co., also had a Gravity Railroad built by the Pennsylvania Coal Co. and completed in 1850. A canal basin was built at Hawley and the shipping of coal and its attending industries played an important part in the development and progress of this enterprising town.

TRANSPORTATION AND PROGRESS

Civilization and progress follow the lines of transportation. The construction of local railway lines as feeders to canal transportation began in 1830 and by 1870 had crowded the canals from their dominant position as coal and freight carriers. From that period the history of the D. & H. canal is one of decline and in 1898 the canal was abandoned. The costly mason work and great feats of engineering, the mile upon mile of low-path, hard-surfaced by the tramp of countless horses and mules, became crumbling ruins covered with rank growths of weeds and underbrush, but the story of this pioneer avenue of transportation, which for seventy years brought employment, comfort, industrial activity and riches to thousands of people, remains an intimate chapter in the history of Northeastern Pennsylvania.

Almost immediately after the abandonment of the canal and Gravity Railroad, construction of a steam railroad over Farview Mountain was commenced and in 1899 passenger and freight trains moved from Honesdale by steam locomotive.

The Erie Railroad Co. ran a branch line into Honesdale in 1868 with a depot at East Honesdale and in 1900 the Erie trains first ran up the old D .and H. Canal Basin to the Union Station on Main Street.

Today the railways still carry much freight but highway express trucks and buses have absorbed much of the railroad business.

Travel and transportation began in Wayne Co. by means of horse, canal and gravity. Some members of the present generation may live to see both travel and transportation taken over by jet planes hurtling through the air at 400 miles per hour.

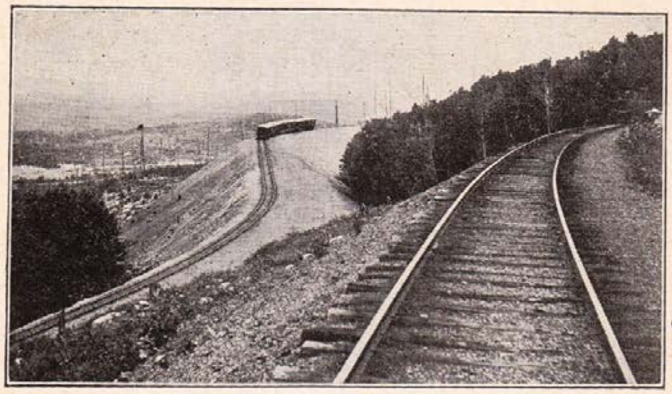
(Sources of information: "History of the D. & H. Canal" by Edwin LeRoy and "America's First Locomotive" by Edwin Callaway.)

CUT GLASS

For many years Wayne County was known nationally and internationally for its cut glass. Christian Dorflinger started the industry in 1865 and Dorflinger Glass, blown and cut at White Mills, was furnished over a long period for the White House, for U. S. Ships, the Royal Houses of Europe and the elite everywhere. Glass is still cut and displayed by John Dorflinger at White Mills and Louis Rickert on Route #6 at The Corners.

Sunday School Picnic to Farview

By Edwin B. Callaway



The ride from Honesdale to Farview on the Moosic Mountain was free from smoke, cinders and dust. It was exhilirating! Residents of Honesdale looked forward to this trip with great joy and pleasure many weeks in advance of the date set for the Sunday School picnic.

Trains would leave from the Delaware and Hudson passenger depot, Main street, Honesdale, on special schedules. This building is now owned by the Erie Railroad as office and storage.

Open cars were sent to Honesdale from Carbondale to transport the picnickers to the grounds. Sometimes there were not enough open cars to take care of the people and a car would have to be improvised. On one occasion a flat-bottom car, one used to convey lumber and other kind of freight, was used. It was open all right, but the seats ran length-wise of the car and one of the wheels had a "flat." With every revolution of thhe wheel there was a bump, which kept the passengers good natured and furnished plenty of amusing conversation.

At Farview the picnic cars were run on a siding where they remained until time to make the return trip home.

After a short steep climb over hardly packed down redshale path the picnickers rushed to claim tables, which were scattered around in shady places.

Following the dinner, and one ate so much he could hardly walk, it was suggested that the group go to the first observatory, which was only a short distance away. Sauntering along the way some would step off the beaten path to search for wintergreen berries and low bush huckleberries. When the observatory was reached there were several

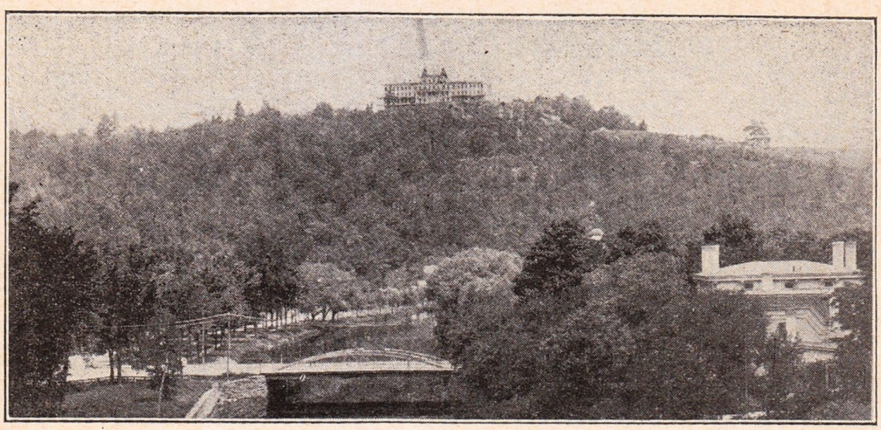
steps to climb before betting to the top. Here was a platform approximately 15 feet square enclosed with heavy planks to prevent one from falling. The surface of these boards contained whittled initials of young men and women enclosed in a heart-shaped etching. All were not so embellished, just initials of each person. The visibility from this point on a clear day was far reaching, but did not compare with the upper observatory, a mile farther up the Moosic Mountain, which from this point twelve lakes were visible, located in Wayne, Susquehanna and Lackawanna counties. Like the first observatory, this structure also contained many markings.

A pleasant memory, now cherished by many.

William Wurtz

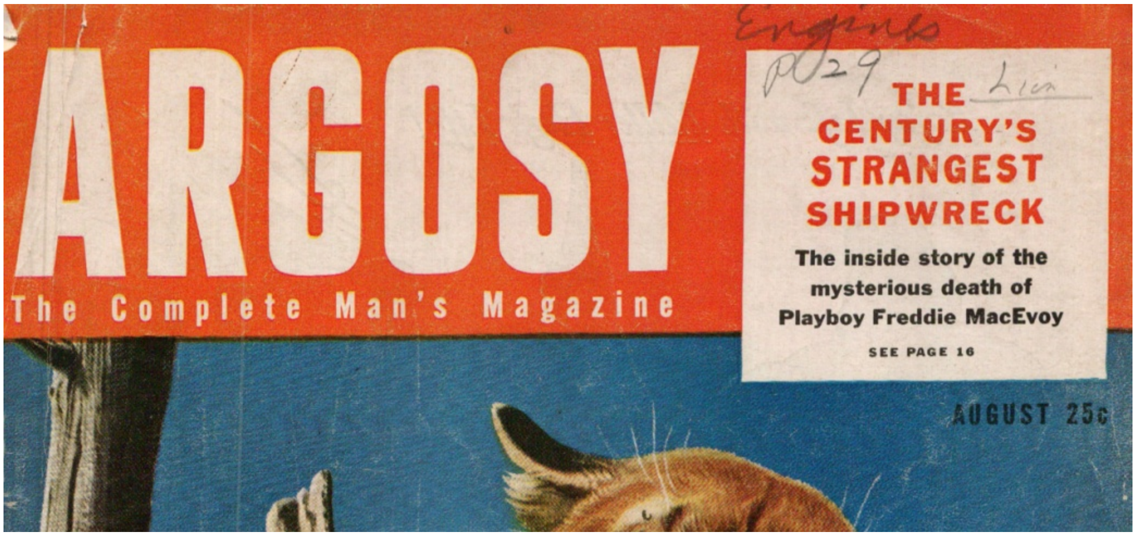
William and Maurice Wurtz who first conceived the idea of hauling coal over the mountain and building the canal.

Maurice Wurtz



Riverside Park and Irving Cliff. Hotel on cliff completed in 1885. Destroyed by fire in 1889.

Here is an article about the *Stourbridge Lion* that was published in *ARGOSY The Complete Man's Magazine*, August (possibly during the 1950s). This article/ clipping in the archives of the Wayne County Historical Society:



Those Were the ENGINES

THIS is a tribute to one of the greatest of the Vanishing Americans—the smoky, clattering, glamorous steam locomotives that have been so large a part of American life and progress.

This year more than 2,000 of them are being dragged away to the yards for scrap, making way for the Diesel engines that can never fully replace them. They were all great beauties, these engines: monsters of power, speed and efficiency. They were the trail blazers of American expansion; they cut their way across the continent, pushing their own rails ahead on flatcars, carving an empire as they went.

On these pages, ARGOSY proudly presents a portfolio of color photographs of the locomotives that have highballed their way through the greatest days of our history.

by Henry B. Comstock

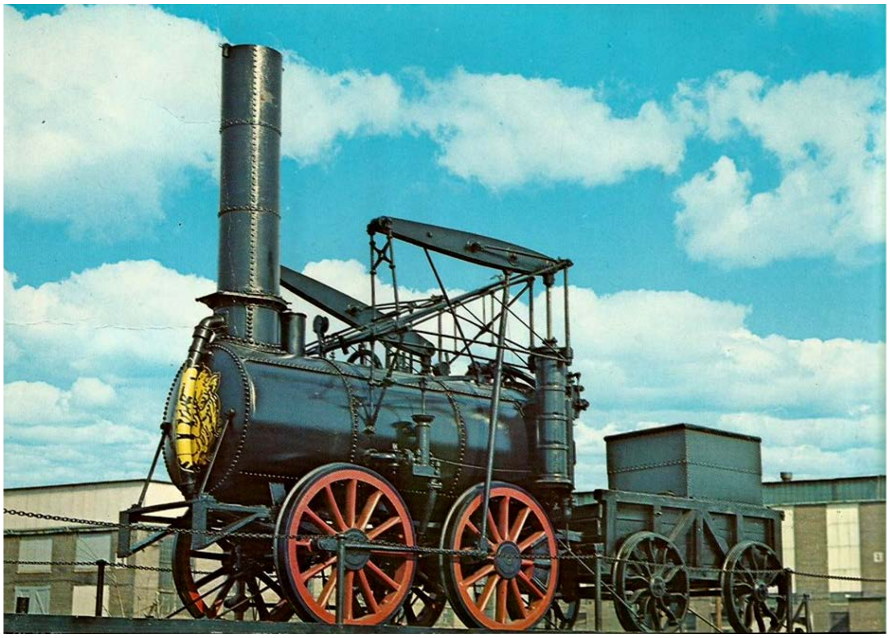
Stourbridge Lion

Imported by the Delaware & Hudson in 1829, this British-built engine was the first to turn a wheel on a commercial railroad in the United States.

LAWRENCE WILLIAMS—RAPHO-G.
COURTESY WAYNE COUNTY HISTORICAL SOC

53. 1973:

The replica of the *Stourbridge Lion* in the Wayne County Historical Society was borrowed for six months by the D&H in 1972-1973, to be a part of the D&H's 150th anniversary celebrations, in 1973, at Albany and in Canada. The photograph of the *Stourbridge Lion* that is given on the cover of this volume (and given below) was taken at the D&H Colonie shops at that time.



Fully working replica of the *Stourbridge Lion* that was made at the D&H shops at Colonie, NY and exhibited at the Century of Progress Exposition at Chicago in 1933.

Here is a newspaper clipping from the archives of the Wayne County Historical Society about this out-of-town trip by the *Stourbridge Lion* in 1972-1973:

Stourbridge Lion Will Leave Honesdale Thurs. And Return Next Spring

The replica of the Stourbridge Lion, the first steam locomotive to run on rails in the United States, will leave Honesdale Thursday morning, but should be back in town within six months.

The Lion replica, housed in the Wayne County Historical Society building on Park street, is scheduled to be loaded on a flat-bed truck by a crew of Delaware and Hudson workers Thursday morning—for the first leg of the old train's journey that will lead to Albany, N. Y., back into the Keystone State and then into Canada.

The replica of the first steam locomotive employed by the D and H to run coal from the Carbondale area to Honesdale and the waiting coal canal barges will be a part of the 150th anniversary of the Delaware and Hudson slated to take place beginning late next April. The Lion (in better shape than at the present time), is expected to be back in Honesdale no later than early summor of 1973.

The actual sesqui-centennial celebration being planned by Thomas O'Brien, a D and H vice president in Albany, will run during the week of April 23. But he guessed that the Lion and the display train will probably be returned to some towns along the route.

O'Brien pointed out that the Lion replica and the tender car will be mounted on a flat bed car and they will be part of a display train that will also include other memorabilia from the D and H past as well as some information about the progress of the railway company since its beginning in 1823.

The railroad vice president also added that he and other officials are examining the possibility of running a steam excursion train during the 150th anniversary celebration. He said that if the excursion train does become a reality, the D and H may run the train from Wilkes-Barre or Binghamton to Albany.

After a recent item concerning the Lion and the display train appeared in the Wayne Independent, O'Brien, formerly from the Carbondale area, received a number of calls requesting rides on the sesque-centennial "limited."

The Lion, which has made other trips but none recently, will be loaded on the truck with the aid of a heavy crane. The train will move down Main street, through Hawley, to Interstate 84, and then head to Colonie, N. Y., via the New York State Thruway.

The last Lion-replica excursion was in 1948 when the train was shipped to Chicago for display. Later the train was taken out of the garage for picture taking and then rolled back where it has remained since.

To commemorate its 150th anniversary, the D&H (1) prepared/organized a display train (see boxed text on the following page), and (2) hosted a steam-powered passenger excursion from Albany to Montreal on Saturday and Sunday, April 28-29, 1973. Several stops were made on this run in the Lake Champlain area so that photo buffs could take photographs.

On the occasion of the D&H sesquicentennial celebrations, D&H president C. B. Sterzing, Jr. said the following: "On the occasion of our 150th anniversary, the officers and employees of the nation's oldest transportation company salute the transportation industry we have helped create. We view our heritage with pride. The energy and vitality that animated the birth of D&H is with us today and expresses our confidence for the future."

Here is an article by Howard Hontz on the D&H's sesquicentennial celebrations that was published in the March 2017 issue of the *Bridge Line Historical Society Bulletin*, p. 6:

From the Top

by Howard Hontz

The D&H's Sesquicentennial celebration

On April 23, 1973, the Delaware and Hudson Railroad reached its 150th birthday. At that time D&H was still solvent, and one of the few eastern railroads that was could say that. The big birthday was reason for celebration, and President C. Bruce Sterzing was determined to make it a "gala event".

An early event of this celebration was a dinner dance at the Hall of Springs at Saratoga Springs, N.Y. on Saturday May 19, 1973. Mr. James B. VanDyke from the Finance Department was selected to be the General Chairman of the event, and he said it was to be "just a family affair". D&H employees came from as far north as Montreal, Canada, south from Pennsylvania, east from Massachusetts and west from as far as St. Louis, Mo. Each employee was allowed to bring one guest, and over 1000 attended. It was a large bill, and some in the Finance Department were not overjoyed with the cost. However, one employee commented, "at long last we'll get to meet people we've known only by phone conversations". Also, there were many good benefits arrived from these celebrations, such as employee morale and goodwill from public, customer and political relations. The previous celebrations of the sesquicentennial year have included public officials and friends (customers) of the company.

Following the Invocation and welcoming remarks by the Vice President of Finance (Mr. Deans), the Asst. Vice President Sales and Industrial Development (Mr. O'Brien) and President and our CEO (Mr. Sterzing), dinner was served. The menu included:

- Mixed Seafood Cocktail Champlain
- Roast Sliced Top Sirloin of Beef Laurentian
- Baked Potato
- Green Beans
- Tossed Green Salad
- Hot Rolls
- Coffee
- Stourbridge Lion Locomotive Cake, which was fashioned after the famous first D&H locomotive, and served with Melba Sauce

Following dinner, Long Service Awards were presented to 10 employees that had 48 or more years of service; four of those had 50 or more years of service. Marie Dunn from Accounting (56 years service) and Conductor Charles Brierley (53 years service), the two senior active employees, were asked to cut the cake. This was a huge cake, and what was not consumed at the dinner was donated to the Wilton State School.

Next and last was dancing from 9 PM to 1 AM. Music was by Tommy Ippolito's band.

The next event of the celebration was to be a steam engine-powered passenger train and a two-day trip, Albany to Montreal one day and return on the 2nd day. This was to be a huge undertaking, as both steam engines and passenger equipment were in scarce supply. In fact, D&H only had a few passenger cars and no steam engines.

This train story will consume too much space to be told in this issue, but will be fodder for another article soon.

D&H Sesquicentennial Celebrations, 1973

The Display Train in 1973:

In the article titled "D&H Gave Steam Locomotives Start" by Barnett Fowler that was originally published in the April 22, 1973 issue of the *Albany Times Union* (article reprinted in the June 2017 issue of the *Bridge Line Historical Society Bulletin* , pp. 30-31, we read: "But today [at the time of the 150th anniversary] . . . the D&H is offering a faithful replica of the *Stourbridge Lion,* to be carried on a display train which will visit several area locations. For instance, on April 23 and 24, the display train will be at the Colonie Yards, east gate, with the *Lion* and other historical items. On Wednesday, April 25, it will be at the West Avenue station in Saratoga Springs; Thursday, April 26, at Cooper Street, Glen Falls; Monday, April 30, at Plattsburgh; on Tuesday, May 1, at Whitehall; on Friday, May 11, at Altamont and on Saturday, May 12, at Mechanicville. / The display train, according to C. B. Sterzing, Jr., president of the D&H Railroad, will be powered by two Alco PA1 type 2000 horsepower diesels, nos. 18 and 19, only two of four such units still operated in the United States. The Stourbridge Lion will be mounted on a flat car. Included in the display train will be the legendary red caboose and two D&H baggage cars, in which historical items will be displayed."

Here is a flyer that was produced by the D&H on the occasion of the 150th anniversary of the founding of the company. An engraving of the *Stourbridge Lion* is given on the back cover of this flyer.

The Delaware and Hudson Railway Company is celebrating its 150th Anniversary on April 23, 1973. Mr. C. B. Sterzing, Jr., President of the D&H Railway, has announced plans for various activities commemorating the sesquicentennial beginning April 23rd. One of the highlights of the celebration will be a steam powered passenger train from Albany to Montreal on Saturday, April 28th and returning from Montreal to Albany on Sunday, April 29th. Plans are also being formulated for a Display Train containing a replica of the original Stourbridge Lion and other memorabilia to make a trip over the D&H lines during April and May, stopping in various cities and towns along the way for a viewing by the public.

For the benefit of all concerned, the following is a brief resume covering the backgound of the D&H:

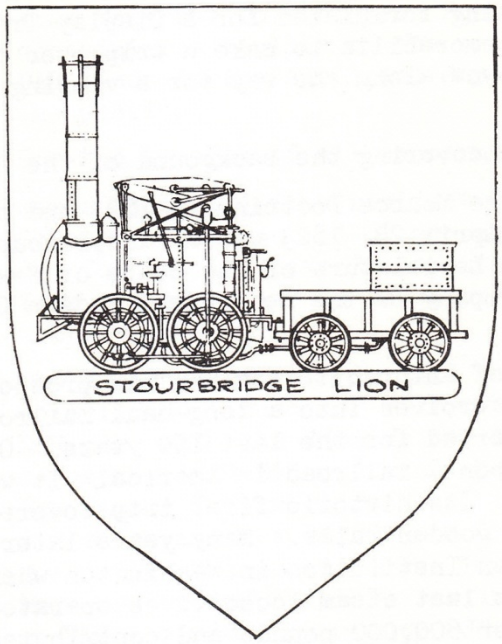
James Monroe, fifth President of the United States, promulgated the Monroe Doctrine in 1823 and the Country knew a period of economic growth and world recognition. April 23, 1823 was an auspicious day for the American Transportation Industry for on that day, the Legislature of the State of New York passed an act to incorporate "The President, Managers and Company of the Delaware & Hudson Canal Company."

The early years were devoted to the transportation and marketing of anthracite coal. This prosperous activity continued for well over one hundred years as the Company evolved into a long-haul railroad. D&H grew with the Country and the communities it has faithfully served for the last 150 years. On August 8, 1829 D&H operated the first steam locomotive ever run upon a railroad in America. It was the famous "Stourbridge Lion" imported from Stourbridge, England. Its historic first trip covered six miles and its 14,000 pounds severely tested the iron strapped wooden rails. Many years later the boiler and parts of the Lion found their way to the Smithsonian Institution in Washington where they rest today, visible testimony to transportation history. The last steam locomotives operated on D&H included the mighty "J" class Challengers which weighed over 600,000 pounds and contributed greatly to the war effort from 1941 through 1946.

It has been noted that the only constant is change. The steam locomotive gave way to the powerful and efficient diesel. Equally significant changes occurred in patterns of revenue traffic enjoyed by D&H. The automobile burst on the scene and as highways improved, Americans chose a new way of travel.

D&H management, perceptive to change, was aware that coal was gradually being replaced as the primary means of household heating. Steps were taken in the Thirtys to reduce D&H dependency on coal as a source of revenue. Management initiated a program that transformed D&H into a high-speed "Bridge Carrier", specializing in the rapid movement of "overhead" carloads received from one connection and delivered to another. The motto "A Century of Anthracite Service" became "The Bridge Line to New England and Canada." Industrial development on line showed similar change and growth. The Edison Works in Schenectady became General Electric Company. Heavy mining and paper production characterize the North section of D&H. Dwindling petroleum resources promise a gradual resurgence of the coal industry in Pennsylvania.

On the occasion of our 150 Anniversary the officers and employees of the Nation's oldest Transportation Company salute the Transportation Industry we have helped to create. We view our heritage with pride. The energy and vitality that animated the birth of D&H is with us today and expresses our confidence for the future.



"the D&H"

54. ***Stourbridge Lion* Symposium, 2004:**

A symposium titled "Symposium III: The 175 Anniversary of the Running of the *Stourbridge Lion*" was held on August 7, 2004. Given below is the article announcing the symposium that was published in the *Wayne County Historical Society Newsletter,* Winter 2004:

WCHS Newsletter, Winter 2004, Volume 19, Number 1, p. 8:

Symposium to Examine Impact of Original Lion

A feature of the 175th anniversary of the first running of the Stourbridge Lion will be a symposium dedicated to understanding the significance of the first steam engine to run in America, the Stourbridge Lion.

The event, officially called "Symposium III: The 175th Anniversary of the Running of the Stourbridge Lion," is chaired by Rod Brown and scheduled for August 7 at the facilities of the Lackawanna Heritage Valley Authority (LHVA). Jane Varcoe is chair of the symposium planning committee.

A panel of experts will discuss the significance of the D&H Canal, early railroading and transportion of coal to major urban areas. The mining of coal and the problems involved in its distribution provided the impetus for the D&H Company to look to England to purchase the most advanced means of transporting coal at the time, a locomotive, still the best means of moving the "black gold."

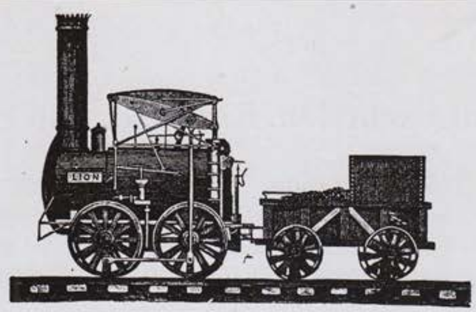
The LHVA is located just off the Casey Highway Exit 6. Following the symposium, slated to end at 3:30 p.m., there will be an early evening excursion train leaving the Wayne County Visitors Center in Honesdale. The ride will terminate with a picnic dinner and entertainment.

Symposium speakers are: Lance Metz, Jim Shaughnessy, William Withuhn, Peter Osborne and Dr. S. Robert Powell. A more detailed description of the areas they plan to discuss will appear in the next issue of the newsletter.

"Symposium speakers are: Lance Metz, Jim Shaughnessy, William Withuhn, Peter Osborne and Dr. S. Robert Powell."

Here is the program of the symposium, August 7, 2004:

1829 2004



175TH ANNIVERSARY

Stourbridge Lion Symposium

August 7, 2004, Lackawanna Heritage Valley Center, Mayfield, PA
Symposium registration, $50: 570-253-3240 or wchs@ptd.net

PROGRAM

Jane Varcoe, Master of Ceremonies

8:00 A.M. **Registration** begins

8:30 A. M. **Welcome**
John Cosgrove, Executive Director, Lackawanna Heritage Valley
Sally Talaga, Executive Director, Wayne County Historical Society

8:45 - 9:15 A.M. **Stourbridge Lion History** by Jim Shaughnessey
Report on the Running of the Lion by Rod Brown

9:15 - 10:00 A.M. **D&H Gravity Railroad** by S. Robert Powell

10:00 - 10:15 A.M. Break

10:15 - 10:45 A.M. **General Overview of Anthracite Mining in the Lackawanna Valley in the 19th Century** by S. Robert Powell

10:45- 11:15 P.M. **The 1846 Carbondale Mine Disaster** by Robert Hecht

11:15 - 12:00 P.M. **The D&H Canal** by Peter Osborne
The D&H Roebling Aqueducts by Sandy Schultz

12:00 - 1:00 P.M. Lunch

1:00 - 1:30 P.M. **The "America" Controversy**
by Robert Thayer and Steve Marder

1:30 - 2:15 P.M. **Technical Aspects of the Stourbridge Lion** by Lance Metz

2:15 - 2:30 P.M. Break

2:30 - 3:00 **Business Decisions Relating to the Stourbridge Lion**
by Bill Withuhn

3:00 - 3:15 P.M. **Symposium Wrap-Up** by Rod Brown

* * * * * * * * * * *

Rail Excursion, Barbecue, and Play

4:30 - 9:30 P.M. Stourbridge Lion "Roar of the Lion" Rail Excursion to Lackawaxen, PA. A picnic, featuring the Red Schoolhouse's famous chicken barbecue, will be served. Following the barbecue, a short vignette by the Ritz Company Players, titled *Train of Thought - A Lion's Share of Pride,* will bring to life the historic events of 175 years ago. Cost of rail excursion, barbecue, and play: $35. Contact the Wayne County Chamber of Commerce, at 570-253-1960, for reservations.

Symposium Participants

Rod Brown, Ph.D., historian, collector of railway memorabilia, trustee of the Waymart Area Historical Society and the Wayne County Historical Society

Robert Hecht, Ph.D., educator and author of, among other works, a biography of Philip Hone

Steve Marder, railroad historian

Lance Metz, Curator and Executive Director of the National Canal Museum, Easton, PA

Peter Osborne, Executive Director of the Minisink Valley Historical Society

S. Robert Powell, Ph.D., Executive Director of the Carbondale Historical Society

Sandy Schultz, Assistant Superintendent of National Park Service Upper Delaware Scenic and Recreational River

Jim Shaughnessy, author of *Delaware and Hudson: The History of an Important Railroad whose Antecedent Was a Canal Network to Transport Coal*

Robert Thayer, antique dealer and author of the article on the mystery of the *America*

Bill Withuhn, Curator of the Transportation Area of the Smithsonian Institution in Washington, DC

D&H Symposium III Coordinators

Rod Brown, Wayne County Historical Society and Waymart Area Historical Society
S. Robert Powell, Carbondale Historical Society and Museum
Sally Talaga, Wayne County Historical Society
Jane Varcoe, Waymart Area Historical Society

1904

Stourbridge Lion Souvenirs

1. *Stourbridge Lion* Taken Apart by Ulysses Valentine Wheeler:

Ulysses Valentine Wheeler, who was born February 5, 1819, and who died in January, 1869, took the *Stourbridge Lion* apart and forged it into bolts and other irons that were used on the D&H track from Honesdale to Waymart. That we know from the biographical portrait of Wheeler that is given on pp. 206-208 of *History of the First Presbyterian Society of Honesdale* by Rhamanthus Menville Stocker, 1906. Our thanks to John V. Buberniak for bringing to our attention this portrait of Wheeler, as follows:

"Ulysses Valentine Wheeler was born February 5, 1819, and he died in January, 1869. He was a grandson of Benjamin Wheeler, of Mount Pleasant. He married Caroline A. Beers daughter of Nathaniel Beers, April 27, 1843. He learned the blacksmith trade of his uncle Ambrose Wheeler and had his residence on the corner of Court and Eleventh streets. He was an ingenious man and attracted the attention of the Delaware & Hudson Canal managers who gave him charge of the horses and men on their road from Honesdale to Waymart. He had thirteen horses of his own and was foreman over three hundred men. His life was an active one and after his decease the work that he had charge of was divided up among four foremen. <u>He took the Stourbridge Lion* apart and as it was largely composed of wrought iron, he forged it into bolts and other irons that were used on the track from Honesdale to Waymart</u> [emphasis added]. In his effort to save something for the company he destroyed parts of a valuable relic. Notwithstanding his many temporal duties he found time to do a vast amount of personal work for the Master whom he served. He was a trusted helper of Dr. Dunning, who would say to him: "Have you spoken to Mr. A? I think he is under conviction." He was regular in his attendance at prayer meetings, and it was said that there were few persons among his associates that he had not spoken to on the subject of religion. He died when only 50 years of age but he left a name for personal work that is still remembered in the church. Of his five children one is living, Mrs. Jennie Goodwin, the well known singer, for many years of Green Ridge, but now of New York. Mrs. Wheeler still lives, cheerful and faithful at 80 years of age."

"*Note. Since writing the above there appeared in the *Independent* an article copied from the New York Sun in which it is stated that one Charles Law, of Pittston, knows where all of the parts of the Stourbridge Lion are. Mrs. Wheeler, February 11, 1905, made statements substantially as follows : <u>I was married to U. V. Wheeler in 1843 and he began to take the Stourbridge Lion apart before he married me. It stood above where the Fowlers' mill now is and he had a blacksmith shop where the company's barn now is. He forged parts of the Stourbridge Lion on his anvil at different times and the bolts and braces he made were used on the high works. He forged up what I would call the handles, (probably the side bars.)</u> [emphasis added]

He told me that the Stourbridge Lion would be more valuable as a relic than the value of the iron he was forging, in a few years, for it was beginning to be talked about then, but he had to obey orders. Several men helped him as strikers and Leon Smith one of these strikers told me after my husband's death that he remembered that a spark from the anvil burned Mr. Wheeler's wrist, causing him to lose a pint of blood while he was holding a piece of the Stourbridge Lion on the anvil for the strikers. Mrs. Wheeler's mind is clear and her account is so circumstantial that it seems certain that she is correct in her statements and that portions of the valuable relic are lost forever. John Torrey made exhaustive researches which are in the hands of the government at Washington and they are making an earnest effort to supply all of the parts of the first engine that was run on a track in America."

Recapitulation on *Stourbridge Lion* Dis-assembly:

Under instructions from the D&H, Ulysses Valentine Wheeler took apart the *Stourbridge Lion.* Dis-assembly began before 1843 and was completed before 1869 (when Wheeler died). The *Stourbridge Lion*, at the time dis-assembly began, stood where, in 1905, Fowler’s mill stood. Disassembly took place in the blacksmith shop that was located where the D&H barn stood in 1905. The *Stourbridge Lion* was largely composed of wrought iron. Wheeler forged that iron into bolts and other irons that were used on the track from Honesdale to Waymart; also forged into braces that were used on the high works.

2. *Stourbridge Lion* Souvenir Spoon:

The design for this *Stourbridge Lion* Souvenir Spoon was patented June 2, 1891. The notice given below was included in the *Twenty-First Anniversary Edition, May 18, 1893, of the Carbondale Leader*, the historical section of which was pasted by P. C. Gritman or his wife into one of the remarkable Gritman scrapbooks, now in the archives of the Carbondale Historical Society.


THE STOURBRIDGE LION SOUVENIR SPOON.

DESIGN PATENTED JUNE 2 '91.
CHAS. PETERSEN, HONESDALE, PA.

THE "Stourbridge Lion," so called from the mauufacturing town in which it was built—Stourbridge, England,—and the face of a lion which adorned the front of the boiler, was the first locomotive ever run upon a railroad in America. It was built in 1828 by Foster, Rastrick & Co., for and imported by the Delaware & Hudson Canal Company in 1829. On the 8th day of August of that year it was placed upon the rails of their road at Honesdale, Pa.

The *Stourbridge Lion* Souvenir Spoon was a sterling silver spoon. It was offered for sale in three different sizes: orange, tea, and coffee.

THE STOURBRIDGE LION SOUVENIR SPOON.

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> "Intelligent spectators expressed fears that in being run over the curved trestling which crosses the Lackawaxen, it would leave the track and plunge into the stream, but Horatio Allen, Esq., who superintended the trial, replied that to avoid unnecessary risk of personal harm, he would alone make the first trip over the curved trestling, and, stepping on the platform, he put on steam slowly until approaching the curve, when he applied more steam, and, with a majestic appearance, it ran with speed and safety over the curved trestling and onward to near to 'Seely's Pond.' There he reversed the motion and ran back to Honesdale, greeted with the booming of cannon and the shouting cheers of the assembled spectators."

The undersigned has patented a design for a SOUVENIR SPOON, upon which an exact representation of the Stourbridge Lion is reproduced in the highest style of art. The lion's head also embossed upon the handle is an accurate copy of Rosa Bonheur's famous painting. The name of the engine and the date and place of its trial appear on the narrower portion of the stem. A history and description of the Stourbridge Lion accompanies each Spoon.

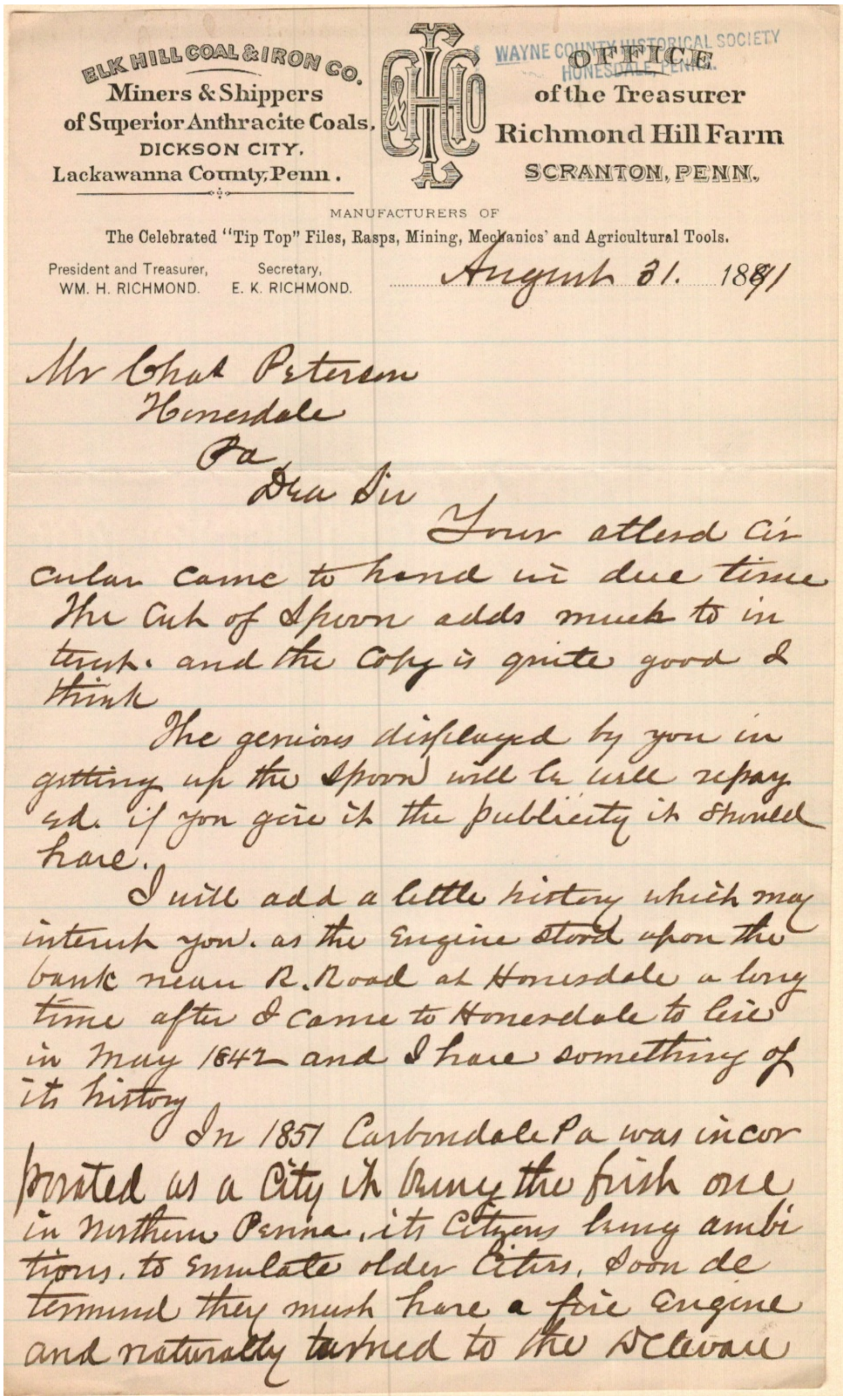
The die work and manufacture of the Souvenir Spoon, in Tea, Orange and Coffee, are by Gorham Mfg. Co.

Chas. Petersen

HONESDALE, PA.

[OVER

Here is a letter dated August 32, 1891, from William H. Richmond to Charles Peterson, about the *Stourbridge Lion* Souvenir Spoon. Letter in the archives of the Wayne County Historical Society.



ELK HILL COAL & IRON CO.
Miners & Shippers
of Superior Anthracite Coals,
DICKSON CITY,
Lackawanna County, Penn.

WAYNE COUNTY HISTORICAL SOCIETY
HONESDALE, PENNA.

OFFICE
of the Treasurer
Richmond Hill Farm
SCRANTON, PENN.

MANUFACTURERS OF
The Celebrated "Tip Top" Files, Rasps, Mining, Mechanics' and Agricultural Tools.

President and Treasurer, WM. H. RICHMOND. Secretary, E. K. RICHMOND.

August 31. 1891

Mr Chas Peterson
Honesdale
Pa

Dear Sir

Your attested circular came to hand in due time. The Cut of Spoon adds much to interest. and the Copy is quite good I think

The genius displayed by you in getting up the Spoon will be well repayed. if you give it the publicity it should have.

I will add a little history which may interest you. as the Engine stood upon the bank near R. Road at Honesdale a long time after I came to Honesdale to live in May 1842 and I have something of its history

In 1851 Carbondale Pa was incorporated as a City it being the first one in Northern Penna. its Citizens being ambitious. to emulate older Cities. soon determined they must have a fire engine and naturally turned to the Delaware

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................188

and Hudson Co for assistance. and a part of this Engine was used at their shops in making the first fire Engine in this part of the State.

The Boiler fell into the hands of a Foundry Company at Carbondale and was used to make steam up to about 1875, when it was replaced by a larger one. In 1876 I was interested in seeing it placed on Exhib. it a Centenial fair Philadelphia, and offered the owners Eight Hundred dollars for it with the view of sending it to the Fair for Exhibition, but my offer was not accepted.

A short time since as you may have obsened it has gone to Smithsonian Institute Washington D.C. where it will be preserved as a relic. no doubt a long time.

Yours truly
Wm H. Richmond

P.S.
Please send me a half dozen Circulars. that I may send them to friends. R—

3. Bolts from *Stourbridge Lion:*

Souvenir collectors being what they are, Anton Roemmelmeyer, a lathe operator in the tool room at the D&H Roundhouse, had in his collection an original iron bolt from the *Stourbridge Lion*, which he prized greatly, so we learn from his biographical portrait that was published in the February 1, 1934 issue of *The Delaware and Hudson Railroad Corporation Bulletin.* From that same biographical portrait, we learn that when the *Stourbridge Lion* arrived in Chicago to be exhibited at the World's Columbian Exposition in 1893, all the substitute bolts that Reommelmeyer had installed in the engine, and many others as well, had been removed by souvenir hunters during the trip to Chicago. In Roemmelmeyer's biographical portrait, we read:

"More highly prized than his [Anton Roemmelmeyer] coins, however, is a bolt which was part of the original locomotive Stourbridge Lion when it made its now famous first rail run in America. In 1893, when the boiler and other parts of this engine were assembled for shipment to the Worlds Columbian Exposition in Chicago, it was found [Mr. Roemmelmeyer worked as a lathe operator in the tool room at the D&H Roundhouse] that a number of iron bolts needed replacement. One of those which he removed [in making the necessary replacements for shipment of the Stourbridge Lion to Chicago] Mr. Roemmelmeyer kept as a souvenir. Incidentally, when the engine reached Chicago, all the substitute bolts, and many others, had been removed by souvenir hunters." (Biographical sketch of Anton Roemmelmeyer titled "Carbondale Carbondale Gazed in Wonder When Electric Lights First Blazed in the D. & H. Locomotive Shop," *The Delaware and Hudson Railroad Corporation Bulletin,* February 1, 1934, pp. 19-20, 28)

4. Paperweights Made from a Piece of the Old *Stourbridge Lion* Boiler:

From an article that was published in the June 4, 1946 issue of the *Carbondale News* titled "Miss Rashleigh Reviews City History at Kiwanis", we learn that Alice Rashleigh had "a paperweight, a car wheel stamped 1829, made from a piece of the old *Stourbridge Lion* boiler. The paperweight was made by Will Johnson's father, who made three such paperweights, all for Carbondale teachers: Alice Rashleigh, Janet Bryden Durfee, and Haybert Hunter Malun. Here is that article:

"I have a paperweight, a car wheel stamped 1829, made from a piece of the old Stourbridge Lion boiler [a paperweight in the shape of a car wheel that is stamped 1829, the paperweight having been made from a piece of the old Stourbridge Lion boiler]. Will Johnson's father—a D. & H. employe--made three, one for Janet Bryden Durfee, one for Maybert Hunter Malun, and yours truly, three teachers. Charles Law collected the pieces and you'll see the engine at the Smithsonian Institute, Washington, D. C. When I saw it, I told the guard it was not all there. He thought I was crazy."

5. *Stourbridge Lion:* More Bits and Pieces:

1. In 1883, George R. Love (see above the article "The First Locomotive," *Evening Post,* February 10, 1883) stated: "…my brother John afterwards (about 1850) bought either the Stourbridge Lion or its companion [the *Pride of Newcastle* / *America],* and converted it into a stationary engine where but a few years since I saw it doing its work in pumping the water of a coal shaft at Pittston, Pa. GEO. R. LOVE."

2. In *Hollister* (unpublished manuscript, p. 44, we read: "The non-adaptability of the railroad forbid the use of the locomotive [the Stourbridge Lion] which was abandoned and placed in a shed by the road side for many years. It deserved a better fate. Preserved in its integrity, it would have been a century hence the greatest railroad relic of modern times. Its boiler is till utilized in Carbondale, while its two steam chests respectively find consideration, one at the home of Hon. John B. Smith, Supt. Penn Coal Co, Dunmore; the other with our antiquarian friend Steuben Jenkins, Esq., of Wyoming."

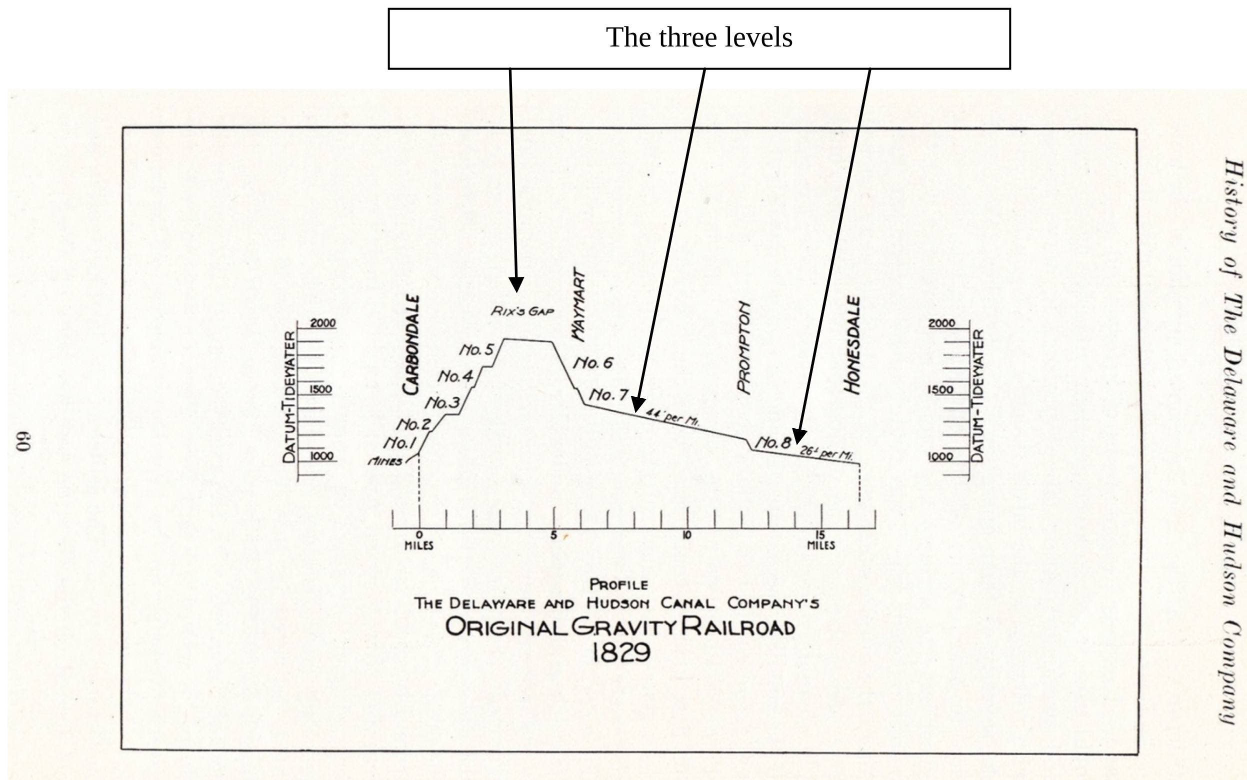
3. When the *Stourbridge Lion* was placed in the Smithsonian Institution in Washington, D. C., the curator acquired as many of the parts as possible of the original engine. One of the cylinders of the *Stourbridge Lion* and the connecting rods and pumps were, at that time, in the possession of Mr. George B. Smith of Dunmore. The heirs of Steuben Jenkins of Wyoming County were said to have other parts of the engine.

1905

Food for Thought

1. Three Engines Not Four:

The D&H needed three steam engines in 1829 to move the cars on the three long levels in the 1829 configuration: Level 5 (the Summit Level), the Six-mile level (between Waymart and Prompton), and the Four-mile level (between Prompton and Honesdale.



Steam engines, such as the ones Horatio Allen bought for the D&H when in England, were expensive. The cost of each engine, in addition to transportation costs, was about $3,000. The D&H would not have purchased any more engines than needed. It is highly unlikely that the D&H would have asked Allen to purchase a spare.

Relying on Allen's judgment, Chief Engineer Jervis commissioned him to buy three locomotives for use on the pioneer railroad of America.

Horatio Allen: "<u>Two of the engines which I ordered were from Stephensons, of Newcastle, by whom had been furnished the plans of the locomotive used on the Stockton and Darlington</u>

Railroad, and one from Foster, Rastrick & Co., at Stourbridge. The three engines were the first departure from the inefficient steam-making locomotives of the Stockton and Darlington Railroad." [emphasis added].

2. Steam Engines OUT, Horses and Horse Cars IN:

When steam locomotives, such as the *Stourbridge Lion,* were found to be unworkable on the tracks in the 1829 configuration, as they were found to be in August 1829, the D&H immediately put them aside and decided to use horses to move the cars on the Summit Level and the Four-Mile Level and to return the empty cars on the Six-Mile Level--just as they used horses on all of the other levels in the 1829 configuration. Two months after the unsuccessful runs of the *Stourbridge Lion,* the Gravity Railroad opened—with horse cars designed and built to handle the return of the empty cars on the Six-Mile Level.

3. Names of these English Engines:

These English engines *(Stourbridge Lion, Pride of Newcastle, Delaware, Hudson)* were not given names by their English manufacturers. At most, they would have been referred to as "the D&H engine" or "Engine for America" or "Allen's Engine for America". The engine with the face of a lion painted on the boiler was not called "the Stourbridge Lion" by the English.

4. Horatio Allen said he bought three engines; *State*, who is an excellent historian, says Allen bought four engines. Who are we to believe?

5. Robert Thayer, an antique dealer from Sheffield, MA, "found" in an antique shop/junk shop in the spring of 1981 in New York City's upper east side a box, the inscriptions on which present data that would have us believe that a D&H engine called "America" blew up on July 26, 1829, on Level No. 5 on the D&H Gravity Railroad, thereby making it, not the *Stourbridge Lion,* the first locomotive to run in the western hemisphere. On this question, see "The Case of the Vanishing Locomotive" by John Demos and Robert Thayer that was published in *American History,* October 1998. See also Raymond State's remarkable book titled *The Pride and the Lion,* published by the Wayne County Historical Society.

1906
In the Caboose

Additions for Volume II:

1. Portrait of James Clarkson from First National Bank portrait collection:

Additions for Volume III:

1. Portrait of Joseph B. Van Bergen from First National Bank portrait collection:

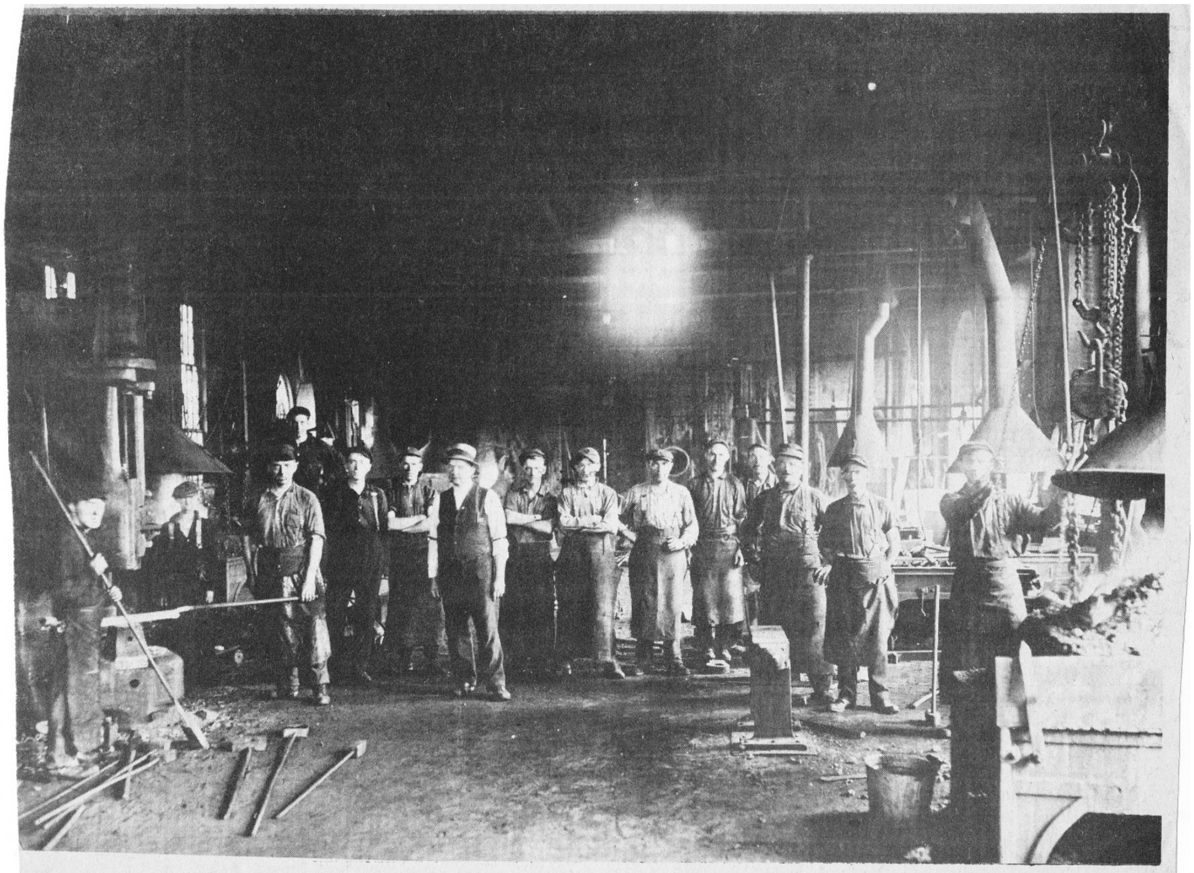
Additions for Volume IV:

1. Portrait of William W. Bronson from First National Bank portrait collection:

Additions for Volume V:

1. D&H Blacksmith Shop, 1913

Shown below is a photograph of the Carbondale D&H blacksmith shop and the blacksmiths who worked there in 1913. The newspaper clipping from which we have produced this copy of this photograph is in the Marianne Stratford collection of the Carbondale D&H Transportation Museum.



D&H BLACKSMITHS -- Day crew of the D.&H. Blacksmith Shop in 1913 and, standing from left, are Billy Cornell, Joseph Lynady, Henry Puchert, Chase Woody, Henry O'Boyle, Paul Puchert, Tim Lynady, Mike Lynady, John Willis, Charles Paik, Bob Talley, John Willis, Willy Gobbell, Joseph Lindsey, and Max Weidman.

"D&H BLACKSMITHS—Day crew of the D.&H. Blacksmith Shop in 1913 and, standing from left, are Billy Cornell, Joseph Lynady, Henry Puchert, Chase Woody, Henry O'Boyle, Paul Puchert, Tim Lynady, Mike Lynady, John Willis, Charles Paik, Bob Talley, John Willis, Willy Gobbell, Joseph Lindsey, and Max Weidman"

2. Joseph N. Wilcox, who contributed money to the Emergency Hospital fund, September 18, 1889, entered the service of the D&H as a laborer on the Gravity Railroad in June 1873, was promoted to a locomotive engineer on June 18, 1895.

On page 209 of the July 1, 1927 issue of *The Delaware and Hudson Company Bulletin,* we read, in an article titled "Seventeen Employes Pensioned": "Joseph N. Wilcox, No. 56 Canaan St., Carbondale, Pa., (locomotive engineer). Born February 22, 1854. Entered the service as a laborer on the gravity road in June, 1873. Promoted to a locomotive engineer, June 18, 1895. Retirement effective, January 1, last."

Addition for Volume VIII:

1. Gravity Railroad timetable, Takes Effect Monday, July 4, 1898

DELAWARE AND HUDSON CANAL CO.,

GRAVITY RAILROAD.

PASSENGER TIME TABLE.

Takes Effect Monday, July 4, 1898.

{ SUPERSEDING TIME TABLE DATED JANUARY 17 1896. }

STATIONS.	WESTWARD.						
	82	84	86	88	90	92 ✱	94
	A. M.	A. M.	A. M.	P. M.	P. M.	P M.	P. M.
HONESDALE, LEAVE.	7 25	9 35	11 05	1 15	3 30		5 35
PROMPTON,	s 7 41	s 9 51	s 11 21	s 1 31	s 3 46		s 5 51
NUMBER 16,	s 7 47	s 9 57	s 11 27	s 1 37	s 3 52		s 5 57
KEENS,	f 7 52	f 10 02	f 11 32	f 1 42	f 3 57		f 6 02
WAYMART,	s 8 04	s 10 14	s 11 44	s 1 54	s 4 09	5 14	s 6 15
FARVIEW,	f 8 13	f 10 23	f 11 53	f 2 03	f 4 18	f 5 23	f 6 23
Lincoln Ave, CARBONDALE,	f 8 33	f 10 43	f 12 13	f 2 23	f 4 38	f 5 43	f 6 43
Lookout. CARBONDALE,	8 46	10 56	12 26	2 36	4 51	5 56	6 56
City Station, CARBONDALE,	s 8 49	s 10 59	s 12 29	s 2 39	s 4 54	s 5 59	s 6 59
Union Sta., CARBONDALE, ARR.	s 8 50	s 11 00	s 12 30	s 2 40	s 4 55	s 6 00	s 7 00
SCRANTON ARRIVE.	9 34	11 58	1 23	3 25	5 43	7 43	7 43
WILKES-BARRE ARRIVE.	10 14	12 50	2 15	4 20	6 57	8 35	8 35
	A. M.	P. M.	P. M.	P. M.	P. M.	P. M.	P. M.

STATIONS.	EASTWARD.						
	81	83	85	87	89	91 ✽	93
	A. M.	A. M.	A. M.	A. M.	P. M.	P. M.	P. M.
WILKES-BARRE, LEAVE.	5 35	8 00	9 20	11 07	1 35	3 01	4 32
SCRANTON, LEAVE.	6 20	8 53	10 13	M. 12 00	2 20	3 52	5 25
Union Sta., CARBONDALE, LVE.	7 50	9 40	11 05	P.M. 1 25	3 09	4 32	6 08
Main Street, CARBONDALE,	s 7 56	s 9 46	s 11 11	s 1 31	s 3 15	s 4 38	s 6 14
FARVIEW,	s 8 18	s 10 08	s 11 33	s 1 53	s 3 37	s 5 00	s 6 36
WAYMART,	s 8 28	s 10 18	s 11 43	s 2 03	s 3 47	s 5 10	s 6 46
KEENS,	f 8 37	f 10 27	f 11 52	f 2 12	f 3 56		f 6 55
NUMBER 16,	f 8 40	f 10 30	f 11 55	f 2 15	f 3 59		f 6 58
PROMPTON,	f 8 46	f 10 36	f 12 01	f 2 21	f 4 05		f 7 04
HONESDALE, ARRIVE	s 9 05	s 10 55	s 12 20	s 2 40	s 4 24		s 7 23
	A. M.	A. M.	P. M.	P. M.	P. M.	P. M.	P. M.

s Indicates regular stop. *f* Stop on signal, or on notice to Conductor. All trains will run daily, except Sundays.
✽ Trains Nos. 91 and 92 will run between May 28 and October 15 only.

CONNECTIONS :—Trains 82, 84, 86, 88, 90 92 and 94, at Carbondale, with Trains for Scranton, Wilkes-Barre, New York, Philadelphia, &c., and Binghamton, Elmira, and the West.
Trains 82, 90 and 92 at Carbondale with Erie R. R., for Susquehanna, &c.
Trains 81, 83, 85. 87, 89, 91, and 93, at Carbondale, with Trains from Wilkes-Barre, Scranton, &c.
Trains 83 and 93, at Carbondale, with Train from Susquehanna, &c.
Train 88, at Carbondale, with Train for Oneonta, Albany, Saratoga, Boston, &c.
Trains 91 and 93, at Carbondale, with Train from Saratoga, Albany, &c.
Train 87, at Honesdale, with Erie Railway for Port Jervis, Middletown and New York
Trains 86 and 90, at Honesdale, with Erie Railway from New York, &c.

Additions for Volume X:

1. *D&H Timetable, Wilkes-Barre/Carbondale, September 20, 1914.* Timetable in the collection of the Forest City Historical Society and made available for publication here on May 31, 2017 by Peggy Brager:

DELAWARE AND HUDSON

PENNSYLVANIA DIVISION LOCAL TIME TABLE

For time of trains on other Divisions and connecting lines see Complete Folder.

EFFECTIVE SEPT. 20, 1914

AT 12:01 A. M.

"The D&H."

These tables show the time trains should arrive at and depart from the several stations and connect with other trains, but their departure, arrival or connection at time stated is not guaranteed. The time of connecting lines is published for the information of passengers, and every care is taken to keep it correct, but this Company does not hold itself responsible for any errors or omissions therein.

JOHN J. COYLE, D. P. A.
SCRANTON, PA.

A. A. HEARD, G. P. A.
ALBANY, N. Y.

No. 28

STATIONS	Miles	CARBONDALE TO WILKES-BARRE WEEKDAY														SUNDAY							
		502	506	510	512	516	518	520	522	524	504	526	528	530	508	532	534	536	520	514	538	540	542
		A. M	A. M	A. M	A. M	A. M	A. M	P. M	P. M	P. M	P. M	P. M	P. M	P. M	P. M	A. M	A. M.	A. M	P. M.	P. M	P. M	P. M.	P. M.
Carbondale ... Lv.	0	5.50	7.00	8.10	9.00	10.00	11.30	1.00	1.40	2.40	4.15	4 45	5.45	7.10	10.35	8.40	10.00	11.30	1.00	2.40	5.50	8.40	10.00
Mayfield	3	5.55	7.04	8.15	9.04	10.04	11.35	1.04	...	2 44	....	4 49	5.49	7.13	10.38	8.45	10.04	11.35	1.04	2.44	5.54	8.43	10 04
Jermyn	4	5.59	7.07	8.19	9.07	10.08	11.39	1.08	1.48	2 48	....	4 53	5.53	7.17	10.43	8.49	10.08	11.39	1.08	2.48	5.59	8.48	10.08
Archbald	7	6.04	7.11	8.24	9.11	10.12	11.44	1.12	1.52	2.52	4.25	4.57	5 57	7.21	10.48	8.54	10.12	11.44	1.12	2.52	6.04	8.53	10.12
Winton	8	6f07	7f13	8.27	.....	10f15	.....	1f15	....	.....	.....	5f00	6f00	7f24	..	8f57	10f15	.....	1f15	2f54	6f07	8f56	10f15
Jessup-Peckville	9	6.11	7.16	8.31	9.16	10.18	11.51	1.18	1.57	2.57	4.31	5 03	6.03	7.27	10.54	9.01	10.18	11.51	1.18	2.57	6.10	8.59	10 18
Olyphant	11	6.15	7.21	8.35	9.21	10.22	11.55	1.22	2.01	3.01	4.35	5 07	6.07	7.31	10.58	9.05	10.22	11.55	1.22	3.01	6.14	9.03	10 22
Dickson	12	6.19	7.25	8.39	9.25	10.25	11 59	1.25	2.05	3.05	.....	5 10	6.10	7.34	11.01	9.09	10.25	11.59	1.25	3.05	6.17	9.06	10.25
Providence	14	6 23	7.29	8.43	9.29	10.29	12.03	1.29	2.09	3.09	.....	5.14	6.14	7.38	11.05	9.13	10.29	12.03	1.29	3.09	6.21	9.10	10 29
Green Ridge....	15	6.26	7.32	8.46	9.32	10.32	12.06	1 32	2.12	3.12	4.43	5 17	6.17	7.41	11.08	9.16	10 32	12.06	1.32	3.12	6.24	9.13	10 32
Scranton .... Ar	16	6.30	7.35	8.50	9.36	10.35	12.10	1.35	2.15	3.15	4.47	5.20	6.20	7.45	11.12	9.20	10.35	12.10	1.35	3.15	6.28	9.17	10 35
Scranton Lv	16	6.35	7.40	.....	9.41	.....	.....	1.40	....	3.20	4.55	5 30	6.25	7.50	11.17	9.25	10.40	12.15	1.40	3.20	6.32	9.22	10.40
South Scranton	18	6.42	...	.....	.....	.....	.....	1f47	....	3.27	...	5f37	6.33	7f58	11f26	9f32	10f47	.....	1f47	3.27	6f41	9f31	10f48
Minooka-Taylor	20	6.46	7.48	....	9.51	.....	.....	1.51	....	3.31	5.04	5 40	6.37	8.02	11.30	9.36	10.51	12.26	1.51	3.31	6.45	9.35	10 52
Moosic	23	6.51	7.53	....	9.57	.....	.....	1.56	....	3.36	5.09	5 45	6.43	8.08	11.36	9.41	10.56	12.31	1.56	3.36	6.51	9.41	10.58
Avoca	24	6.55	7.57	....	10.01	....	....	2.00	....	3.40	5.13	5.49	6.47	8.12	11.40	9.45	11.00	12.35	2.00	3.40	6.55	9.45	11.02
Pittston	27	7.00	8.02	....	10.05	....	....	2.05	....	3.45	5.17	5.54	6.53	8.18	11.45	9.50	11.05	12.40	2.05	3.45	7.00	9.50	11.08
Yatesville	28	7f03	8f05	....	10f09	....	....	2f07	....	3.48	...	5f57	6f57	8f22	11f48	9 53	11f08	12f43	2f07	3.48	7f03	9f53	11f12
Laflin	30	7.06	8f08	....	10f13	....	....	2f11	....	3.51	....	.	7.00	8.25	11f51	9 56	11f11	12f46	2f11	3.51	7f07	9f56	11f16
Hudson	31	7.10	8.12	....	10.17	....	....	2.15	...	3.55	....	6.03	7.04	8.30	11.55	10.00	11.15	12.50	2.15	3.55	7.11	10.00	11.20
Miners Mills	32	7.12	8.14	.. .	10.19	....	....	2.17	....	3.57	...	6.06	7.07	8.32	11f57	10.02	11.17	12.52	2.17	3.57	7.13	10.02	11.22
Parsons	33	7.15	8.17	....	10.21	....	....	2.20	....	4.00	....	6 09	7.10	8.35	12 00	10.05	11 20	12.55	2.20	4.00	7.16	10.05	11.25
Wilkes-Barre Ar.	35	7 20	8 22	.	10 25	...	....	2.25		4.05	5.35	6 15	7.15	8.40	12*05	10 10	11.25	1 00	2 25	4.05	7.20	10.10	11.30

DRAWING ROOM SLEEPING CAR BETWEEN CARBONDALE AND PITTSBURG ON TRAINS 526 AND 505 DAILY EXCEPT SUNDAY.

PARLOR CAR BETWEEN CARBONDALE AND PHILADELPHIA ON TRAINS 506 AND 525 DAILY EX. SUNDAY

STATIONS	Miles	WILKES-BARRE TO CARBONDALE WEEKDAY														SUNDAY							
		501	507	503	505	509	513	515	511	517	519	521	523	525	527	529	531	533	535	511	537	539	527
		A. M	A. M.	A. M	A. M	A. M	P. M	P. M	P. M	P. M.	P. M	P. M	P. M	P. M	P. M	A. M	A. M.	A. M	P. M	P. M	P. M	P. M	P. M.
Wilkes-Barre Lv.	0	5 50	6 50	7.50	9.15	.....	12.30	...	3 10	.....	4.55	...	6.50	9.35	11 05	7.10	9.15	11.00	1.30	3 10	5.00	7.30	11.05
Parsons	2	5.54	6 54	7.54	.....	.....	12.34	...	3 14	....	4 59	....	6.54	9.39	11 09	7.14	9.19	11.04	1.34	3.14	5.04	7.34	11.09
Miners Mills	3	5.56.		7.56	.....	.....	12.36	....	.....	....	5.02	....	6.56	9.41	11 12	7.16	9 21	11.06	1.36	....	5.06	7 36	11 12
Hudson	4	5.58	6 58	7.58	...	.....	12.38	...	3.18	....	5 04	....	6.58	9.43	11.14	7.18	9 23	11.08	1.38	3.18	5.08	7.38	11.14
Laflin	6	6.02	7f02	8f02	9.25	.....	12f42	...	3.22	....	5.08	....	7.02	9 47	11.18	7f22	9.27	11f12	1.42	3 22	5f12	7f42	11.18
Yatesville	7	6.05	7f05	8f05	..	.....	12f45	.....	3f25	....	5 11	.....	.....	9.50	11f21	7f25	....	11f15	.....	3f25	5f15	7f45	11f21
Pittston	9	6.09	7.09	8.09	9.32	.....	12.49	.....	3 29	. ..	5 15	.....	7.09	9.54	11 25	7.29	9 34	11 19	1 48	3.29	5.19	7.49	11.25
Avoca	11	6.14	7 14	8.14	9.36	.....	12.53	.....	3 34	....	5.19	.....	7.13	9.58	11 29	7.34	9 38	11 24	1.53	3 34	5.24	7.53	11.29
Moosic	13	6.18	7 20	8 18	9.40	.....	12.57	.....	3.38	....	5.23	.....	7.17	10.02	11.33	7.38	9.42	11 28	1.57	3.38	5.28	7.57	11.33
Minooka-Taylor	16	6.24	7 26	8 24	9.46	....	1.03	.....	3.44	.....	5.29	.....	7.23	10.08	11.39	7.44	9 48	11.34	2.03	3.44	5.34	8.03	11.39
South Scranton	18	6.27	7.29	8f27	.....	....	1f06	.....	.....	....	5f33	.....	7f27	10f11	11f43	7f47	9f51	11f37	2f06	....	5f37	8f07	11f43
Scranton .... Ar	19	6.35	7 36	8.35	9.56		1.14	...	3.55	...	5.40	.....	7.35	10.19	11.50	7.55	9 59	11.45	2.13	3.55	5.45	8.15	11 50
Scranton Lv	19	6.45	7 45	8.40	10 05	11.45	1.19	2.18	4.05	5.15	5.45	6.35	7.40	10.25	11 55	8.00	10 05	11.50	2.18	4.05	5.55	8 20	11.55
Green Ridge	20	6.49	7.49	8.44	10 09	11.49	1.23	2.22	4.10	5.20	5.50	6.39	7.45	10 30	12*00	8.04	10 09	11.54	2.22	4 10	5.59	8 25	12*00
Providence	21	6.52	7.52	8.47	10.12	11.52	1.26	2.25	4.13	5.24	5.54	6.42	7.49	10.34	12.04	8.07	10 12	11 57	2.25	4 13	6.02	8 29	12.04
Dickson	23	6.56	7 57	8.51	10.16	11.56	1.30	2.29	4.18	5.30	6 00	6.46	7.54	10.39	12.10	8.11	10.16	12.01	2.29	4.18	6.06	8 34	12.10
Olyphant	24	7.01	8.01	8.55	10.21	12.01	1.35	2.34	4.23	5 35	6.05	6.51	8.00	10.45	12.15	8.16	10.21	12 06	2.34	4.23	6.11	8 40	12.15
Jessup-Peckville	26	7.05	8.05	9.00	10.25	12.05	1.40	2.38	4 28	5.40	6.10	6.55	8.05	10.50	12 20	8.20	10.25	12 10	2.38	4.28	6.15	8 45	12.20
Winton	27	7.08	....	9f03		.....	1f43	.	.....	5f43	...	6f58	....	.	12f23	8f23	....	12f13	....	....	6f18	8f48	12f23
Archbald	28	7.12	8.13	9.07	10.32	12.12	1.47	2.46	4.35	5.46	6.16	7.02	8.11	10.56	12 26	8.27	10 32	12 16	2.46	4.35	6.22	8 51	12.26
Jermyn	31	7.17	8 19	9.12	10.37	12.17	1.52	2.51	4.41	5.51	6.21	7.07	8.16	11.01	12.31	8.32	10.37	12 21	2 51	4.41	6.27	8 56	12.31
Mayfield	32	7.20	8 23	9.15	10f40	12.20	1.55	2.54	4.44	5.54	6 24	7.10	8.19	11.04	12 34	8.35	10f40	12 24	2.54	4.44	6.30	8 59	12.34
Carbondale Ar	35	7.25	8 30	9.20	10 45	12.25	2.00	3 00	4.50	6.00	6.30	7.15	8.25	11.10	12 40	8.40	10.45	12 30	3.00	4.50	6 35	9 05	12.40

2. The Olyphant station on the Valley Road.

D&H Olyphant station. Photograph in the Marianne Stratford collection at the Carbondale Historical Society.

Additions for Volume XI:

1. February 2017, *BLHS Bulletin*, cover photo, with this caption:

"D&H Challenger #1534 leads a 101-car WM-3 at Simpson, Pa. March 19, 1950 photo by Robert F. Collins. BLHS Archives, Jack MacDonald Collection

Portion of S. R. Powell *Letter to the Editor* of the *BLHS Bulletin,* April 2017:

“The Robert F. Collins photograph of D&H Challenger #1534 at the head of a 101-car WM-3 on the cover of the February 2017 *BLHS Bulletin* is a prize winner. In the late 1950s, I was a high school student in Simpson, and sights such as this were a daily occurrence there. The train is shown here as it begins its ascent of the Jefferson Branch of the Erie from Carbondale, through Simpson, to Ararat Summit and beyond.

The grade in the Carbondale yard, from South to North, was 1.31%. From West Carbondale to Forest City the grade was 1.48%. This was the steepest part of the grade on the Jefferson Branch and it was on this portion of the line that a Forest City kicker was used. From Forest City to Ararat Summit the grade was 0.88%. The northbound grade from the yard at Carbondale, PA to the top of Ararat Summit averaged a continuous 1.2 to 1.4%, but was 19 miles in length. The grade from Starrucca up to Ararat was 1.3%. The southbound grade, from the Cascade Wye, near Lanesboro, to the top of Ararat Summit was 1.3 to 1.5%, and was 17 miles long.”

2. *BLHS Bulletin,* February 2017, p. 9, with the caption given below.

A D&H mixed freight rumbles south through Carbondale, Pa. Undated photo by Dick Herbert

Portion of S. R. Powell *Letter to the Editor* of the *BLHS Bulletin* for April 2017:

“Regarding the very nice photograph by Dick Herbert on the bottom of page 9 of the February 2017 issue of the *BLHS Bulletin* of a D&H mixed freight, it must be said that this train is not shown here as it “rumbles south through Carbondale, Pa.” Rather, it is shown here, heading south, through Forest City, Pa. Just a few miles south of Forest City, this train would make its appearance (possibly still rumbling) in Carbondale.”

3. *BLHS Bulletin,* March 2017, p. 5, with the caption given below

A colorful consist of D&H GP39-2 #7408 (green and yellow), with the added prefix 7; GP38-2 #7322 (Cornell Red); lightning-striped (blue and grey) GP39-2 #7608; and a N&W black GP hauls a northbound at WC Cabin in Simpson, Pa., on August 4, 1978 under the control of engineer Bernie Gill. The three leading GP’s came to the D&H at the start of Conrail in April of 1976; the 7408 from the Reading, the 7322 from the LV, and the 7608 new from EMD. Mike Bischak photo.

4. D&H station at Lanesboro

On the 2-page flyer about the Starrucca Viaduct that was produced by the Rail-Trail Council of NEPA is the only photograph that we have ever seen of the D&H station at Lanesboro. The station was built late in 1871 and removed around 1945. Here is that photograph and the caption on it in the Rail-Trail flyer:

This D&H railroad depot was built late in 1871 by the Lackawanna & Susquehanna (a railroad owned by the D&H). The L&S connected to Erie's Jefferson Division at Jefferson Junction (about one mile south of the viaduct) and with the Albany & Susquehanna Railroad (to the north) at Nineveh, NY. This enabled the D&H to ship coal directly to Albany, NY. This depot was removed around 1945.

Additions for Volume XII:

1. Mechanicville, NY.

"In November 1877, an agreement was signed between the Boston, Hoosac Tunnel &Western Railroad (later B&M) and D&H to build a joint yard at Mechanicville, NY for the interchange of freight traffic. The BHT&W completed its connection to Hoosac Tunnel in 1879 and the D&H its route through to Schenectady two years later, creating an East-West line to New England. This bridge route through to Schenectady had a traffic increase at the outset of World War II and the delivery of the Challengers." *(Delaware and Hudson In Color* Volume I by David R. Sweetland, 1992, p. 23)

Post card view of “The D. & H. Power House at Mechanicvville, N. Y.” that was offered for sale on E-Bay on January 7, 2017 by Steve Myers:

“The D. & H. Power House at Mechanicvville, N. Y.”

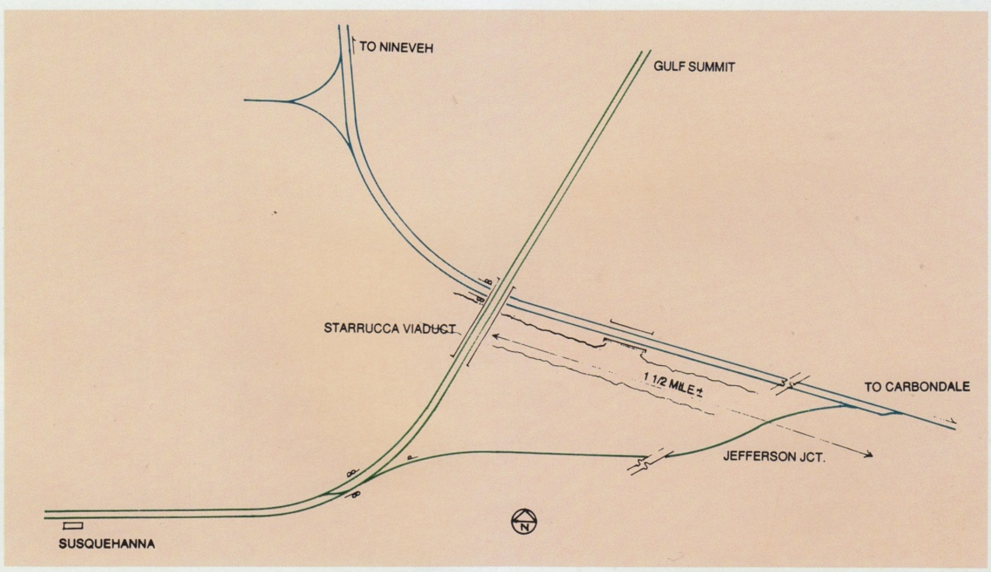
2. More on the Cascade Wye, from *Delaware and Hudson In Color* Volume I, 1992, by David R. Sweetland. Shown here are pages 108-111 for Sweetland's book.

(Left) From the Erie mainline at Lansboro, we are looking down on the D&H's double track main in the valley below. Off the D&H's southbound track swings the empty Cascade Wye for helpers turning to shove trains over the 1.38% grade approaching Ararat Summit. On the Erie line, a semaphore signal and train stop inductor on the east side of the right-of-way were in view in this 1950 scene. Starrucca Viaduct was just west of this location on the Erie mainline.

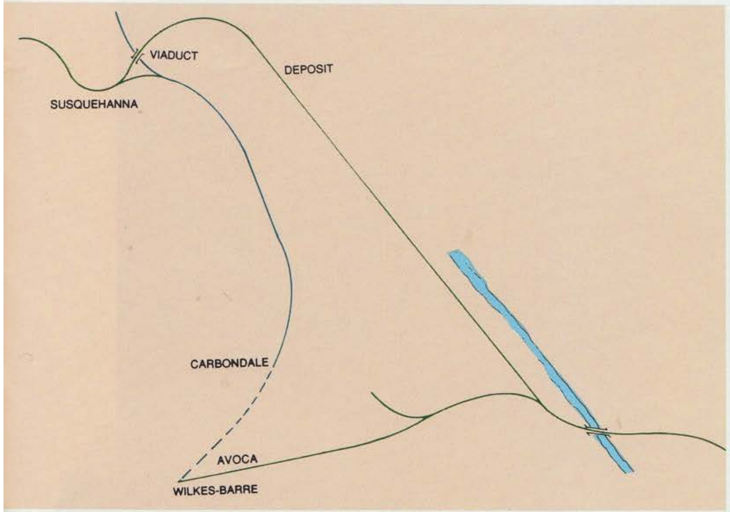
(John Long, Erie Railroad Company Photographer, Dan Biernacki collection)

Lanesboro

In September 1868, the D&H agreed to financially assist the Erie in building a rail line from Carbondale to the Erie mainline at Jefferson Junction. Chartered as the Jefferson Railroad Company, construction started in 1869 north towards Ararat Summit and was opened to traffic in October 1870. At first, the D&H went north via the new line to the junction then west on the Erie to Binghamton before heading east on the Albany & Susquehanna. In order to avoid this westbound move, two years later the D&H built a twenty mile connection from Jefferson Junction (near Lanesboro) to Nineveh on the A&S. The Erie owned the line north of Carbondale to Jefferson Junction until the mid-fifties, finally selling it to the D&H, but retaining local service rights and operating at least one train a week over the line.



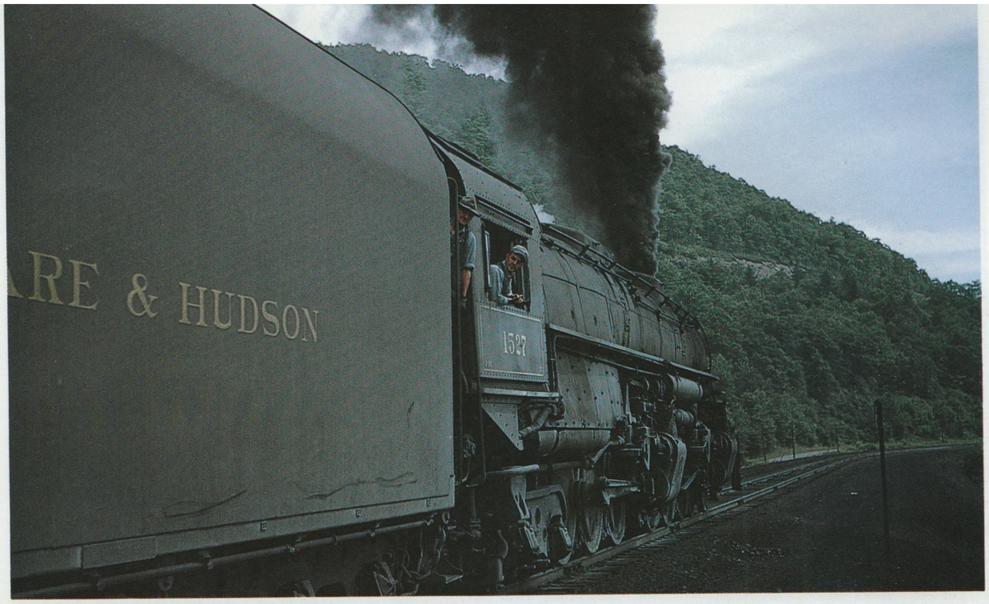
108



South of Starrucca, another five unit consist worked their way south with an RS-3 in the lead. It was early spring of 1966 and a new blanket of green was covering the countryside. The freight was overhead traffic heading for the PRR connection at Buttonwood, Pa. The trailing RS-3 was not quite up to par with a little black smoke being emitted even after the diesel engine came up to speed.

The first installation of CTC on the D&H was completed between Center Village, NY, and Lanesboro in October 1930. This short twelve mile section was later expanded into a complete CTC system between Schenectady and Carbondale, including the line to Binghamton.
(P. J. Hamill)

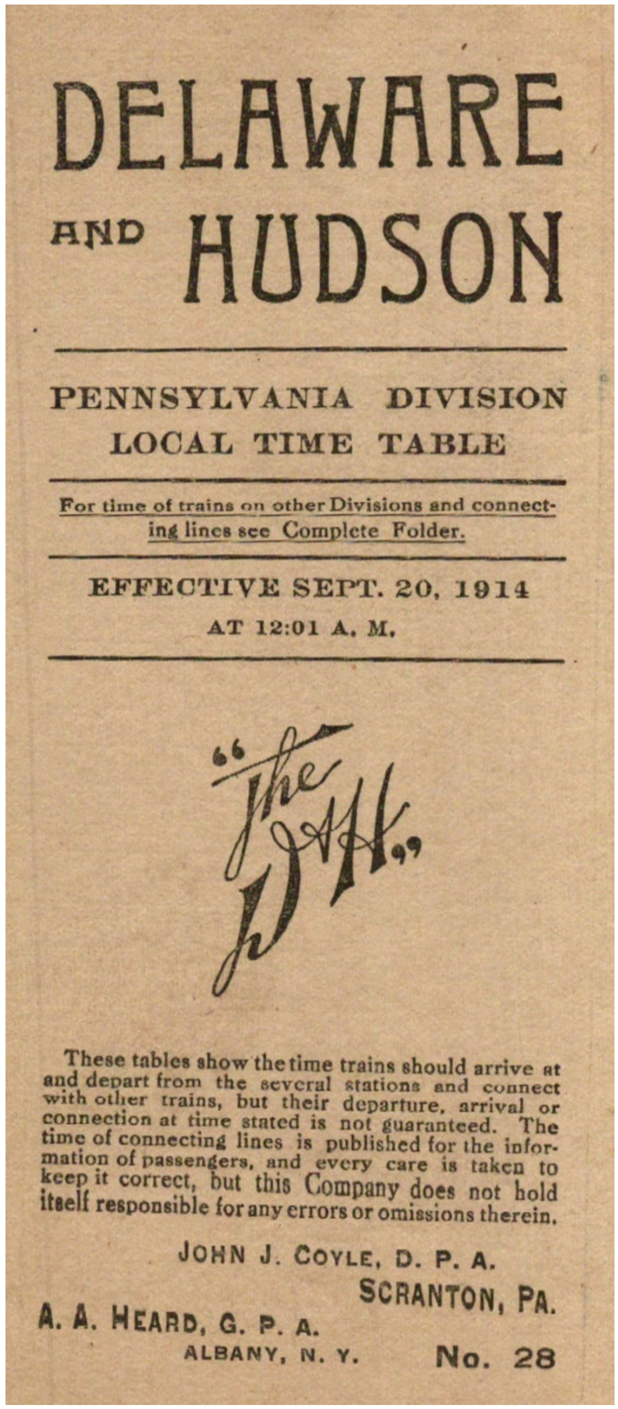




Waiting at the Cascade Wye, a 4-6-6-4 prepared for the shove up the mountain. In order to reach Scranton or Wilkes-Barre, southbound trains had to climb the 1.38% grade to Ararat Summit, requiring a helper for most trains. The road freight approached and passed the wye with a 1500 class Challenger on the head end. As the freight proceeded up the grade, the twin 4-6-6-4 helper moved up the south leg of the wye to the main track. After the train passed the switch, helper #1527 entered the main, first to pick up the wooden road caboose dropped on the main, then proceeded slowly to couple up to the road train which had come to a complete stop. Following a brake test, the hauler and helper whistled off shoving these loads up the mountain. All communication was done by whistles and pressure changes in the brake pipe. It was a twenty mile grade for the helper to work before reaching the summit. As the helper engine passed, the engineer and fireman looked back to see if they recognized the photographer. On the rear platform ladder of the caboose, the conductor hung his mop to dry after washing the floor in his wooden caboose. Above on the ledge was the outline of the Erie right-of-way heading east (to the right). *(All- Marvin H. Cohen)*

3. Four photographs of the Cascade Wye by John Serniak, December 26, 2016:

4. *D&H Timetable, Wilkes-Barre/Nineveh, dated September 20, 1914,* in the collection of the Forest City Historical Society, and made available for publication here on May 31, 2017 by Peggy Brager.


DELAWARE AND HUDSON

PENNSYLVANIA DIVISION
LOCAL TIME TABLE

For time of trains on other Divisions and connecting lines see Complete Folder.

EFFECTIVE SEPT. 20, 1914
AT 12:01 A. M.

"The D&H."

These tables show the time trains should arrive at and depart from the several stations and connect with other trains, but their departure, arrival or connection at time stated is not guaranteed. The time of connecting lines is published for the information of passengers, and every care is taken to keep it correct, but this Company does not hold itself responsible for any errors or omissions therein.

JOHN J. COYLE, D. P. A.
SCRANTON, PA.
A. A. HEARD, G. P. A.
ALBANY, N. Y.
No. 28

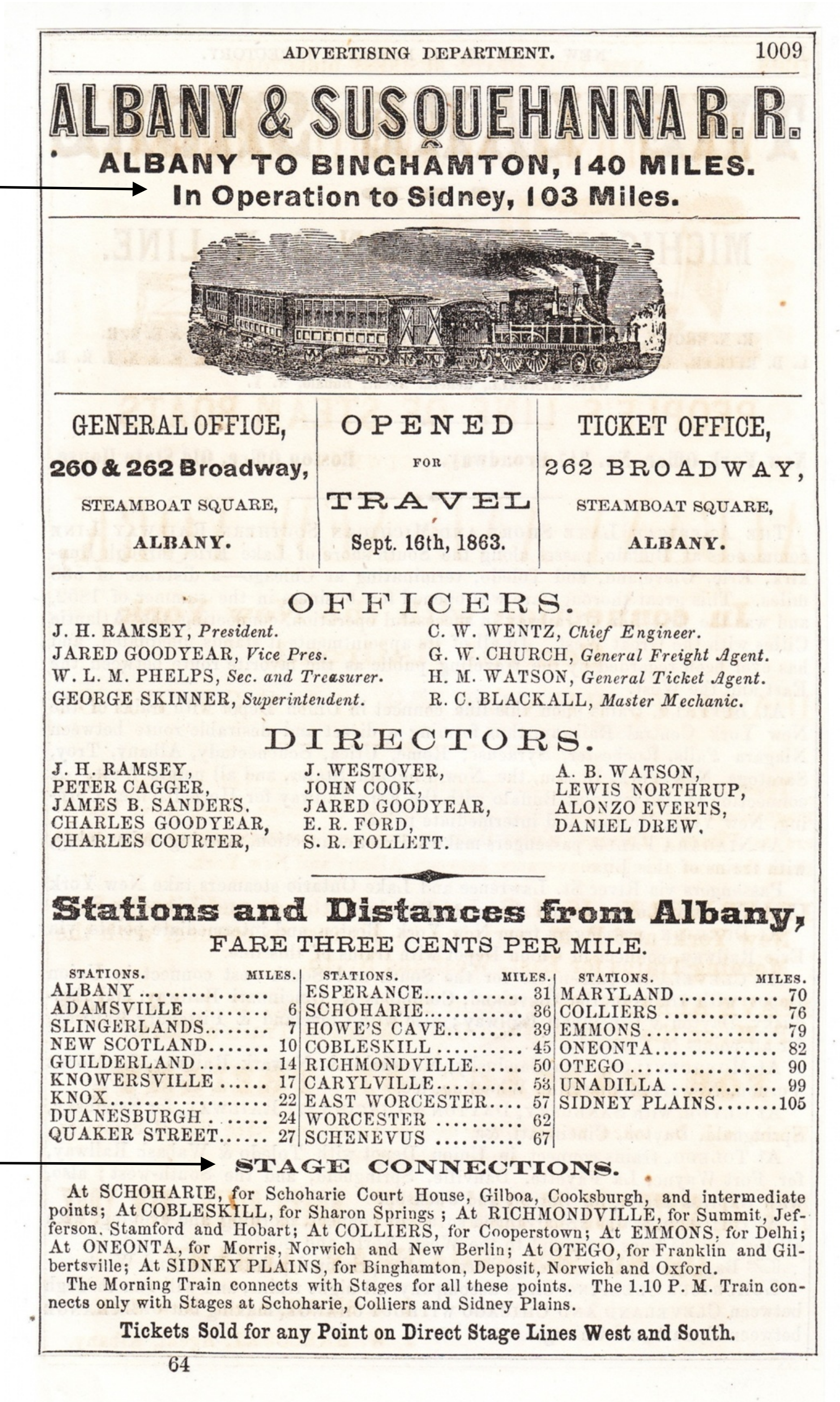
WILKES-BARRE AND NINEVEH

READ DOWN							READ UP				
SUNDAY		WEEKDAY					WEEKDAY			SUNDAY	
511 P. M	571 A. M.	511 P. M.	571 A. M.	507 A. M	Miles		572 A. M.	504 P. M	508 A. M.	572 A. M.	514 P. M
3.10	.....	3.10	.....	6.50		Wilkes-Barre	.....	5.35	12.05	.....	4.05
4.05	.....	4.05	.....	7.45		Scranton	.....	4.47	11.12	.....	3.15
4 55	.....	4.55	.....	8.35	0	Carbondale ..	.....	4.08	10.30	.....	2.35
5.09	.....	5.09	.....	8.49	7	Forest City ...	.....	3.52	10.15	.....	2.21
5.20	.....	5.20	.....	9.00	12	Uniondale....	.....	3.40	10.05	.....	2.09
5.25	.....	5.25	.....	9.05	14	HerrickCentr.	.....	3.36	10f00	.....	2.05
5f31	.....	5f31	.....	9f11	18	Burnwood....	.....	3f27	9f52	.....	1f57
5.38	.....	5.38	.....	9.18	21	Ararat	.....	3.19	9f45	.....	1f50
5.47	. ..	5.47	.....	9.27	26	Thompson ..	.....	3.08	9f34	.....	1.39
5.56	.....	5.56	.....	9.36	29	Starrucca	.....	3.00	9f23	.....	1.31
6f06	.....	6f06	.....	9.46	34	Stevens Point	.....	2.49	9f11	.....	1f19
6.10	.....	6.10	.....	9.51	36	Brandt	.....	2.46	9f07	.....	1f17
.....	.....	.....	.....	...	36	Jefferson Junc.	.....	2.45	.	.....	..
6.16	....	6.16	.....	9.57	38	Lanesboro....	.....	2.42	9.01	.....	1.12
6f24	.....	6f24	.....	10f05	41	Columbia Gro	.. ..	2f36	8f53	.....	1f05
.....	.....	.....	.....	f	46	Tuscarora	.....	.	f	....	..
6 32	9 45	6.32	9.45	10.14	47	Windsor.....	9.25	2.26	8.41	9.25	12.54
6.39	... .	6.39	... .	10.21	50	East Windsor	9f15	2.19	8.34	9f15	12.47
6.49	.. .	6.49	...	10.31	55	Centre Village	9f00	2.11	8.26	9f00	12.37
7.00	10.25	7.00	10.25	10.40	59	Nineveh... ..	8.45	2.05	8.20	.45	12.30

5. Full-page ad for the Albany & Susquehanna Railroad in the *New York State Business Directory for 1867*, p. 1009. Purchased on E-Bay on February 10, 2017, courtesy of John V. Buberniak.

The A&S

"In Operation to Sidney, 103 miles."



ADVERTISING DEPARTMENT. 1009

ALBANY & SUSQUEHANNA R. R.

ALBANY TO BINGHAMTON, 140 MILES.

In Operation to Sidney, 103 Miles.

GENERAL OFFICE,
260 & 262 Broadway,
STEAMBOAT SQUARE,
ALBANY.

OPENED FOR TRAVEL Sept. 16th, 1863.

TICKET OFFICE,
262 BROADWAY,
STEAMBOAT SQUARE,
ALBANY.

OFFICERS.

J. H. RAMSEY, *President.*
JARED GOODYEAR, *Vice Pres.*
W. L. M. PHELPS, *Sec. and Treasurer.*
GEORGE SKINNER, *Superintendent.*
C. W. WENTZ, *Chief Engineer.*
G. W. CHURCH, *General Freight Agent.*
H. M. WATSON, *General Ticket Agent.*
R. C. BLACKALL, *Master Mechanic.*

DIRECTORS.

J. H. RAMSEY,
PETER CAGGER,
JAMES B. SANDERS.
CHARLES GOODYEAR,
CHARLES COURTER,
J. WESTOVER,
JOHN COOK,
JARED GOODYEAR,
E. R. FORD,
S. R. FOLLETT.
A. B. WATSON,
LEWIS NORTHRUP,
ALONZO EVERTS,
DANIEL DREW.

Stations and Distances from Albany,

FARE THREE CENTS PER MILE.

STATIONS.	MILES.	STATIONS.	MILES.	STATIONS.	MILES.
ALBANY		ESPERANCE	31	MARYLAND	70
ADAMSVILLE	6	SCHOHARIE	36	COLLIERS	76
SLINGERLANDS	7	HOWE'S CAVE	39	EMMONS	79
NEW SCOTLAND	10	COBLESKILL	45	ONEONTA	82
GUILDERLAND	14	RICHMONDVILLE	50	OTEGO	90
KNOWERSVILLE	17	CARYLVILLE	53	UNADILLA	99
KNOX	22	EAST WORCESTER	57	SIDNEY PLAINS	105
DUANESBURGH	24	WORCESTER	62		
QUAKER STREET	27	SCHENEVUS	67		

STAGE CONNECTIONS.

At SCHOHARIE, for Schoharie Court House, Gilboa, Cooksburgh, and intermediate points; At COBLESKILL, for Sharon Springs; At RICHMONDVILLE, for Summit, Jefferson, Stamford and Hobart; At COLLIERS, for Cooperstown; At EMMONS, for Delhi; At ONEONTA, for Morris, Norwich and New Berlin; At OTEGO, for Franklin and Gilbertsville; At SIDNEY PLAINS, for Binghamton, Deposit, Norwich and Oxford.

The Morning Train connects with Stages for all these points. The 1.10 P. M. Train connects only with Stages at Schoharie, Colliers and Sidney Plains.

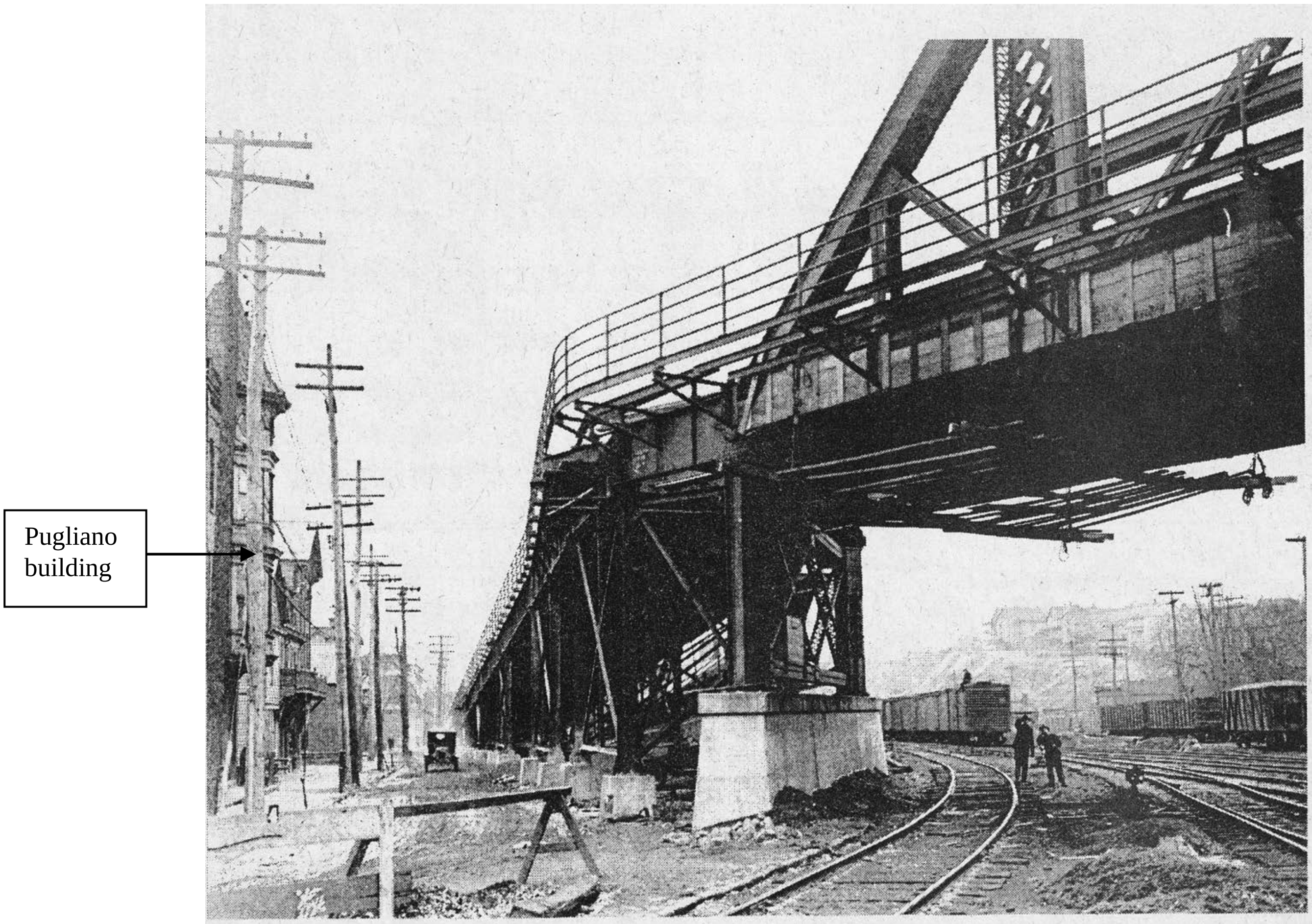
Tickets Sold for any Point on Direct Stage Lines West and South.

64

Stage Connections

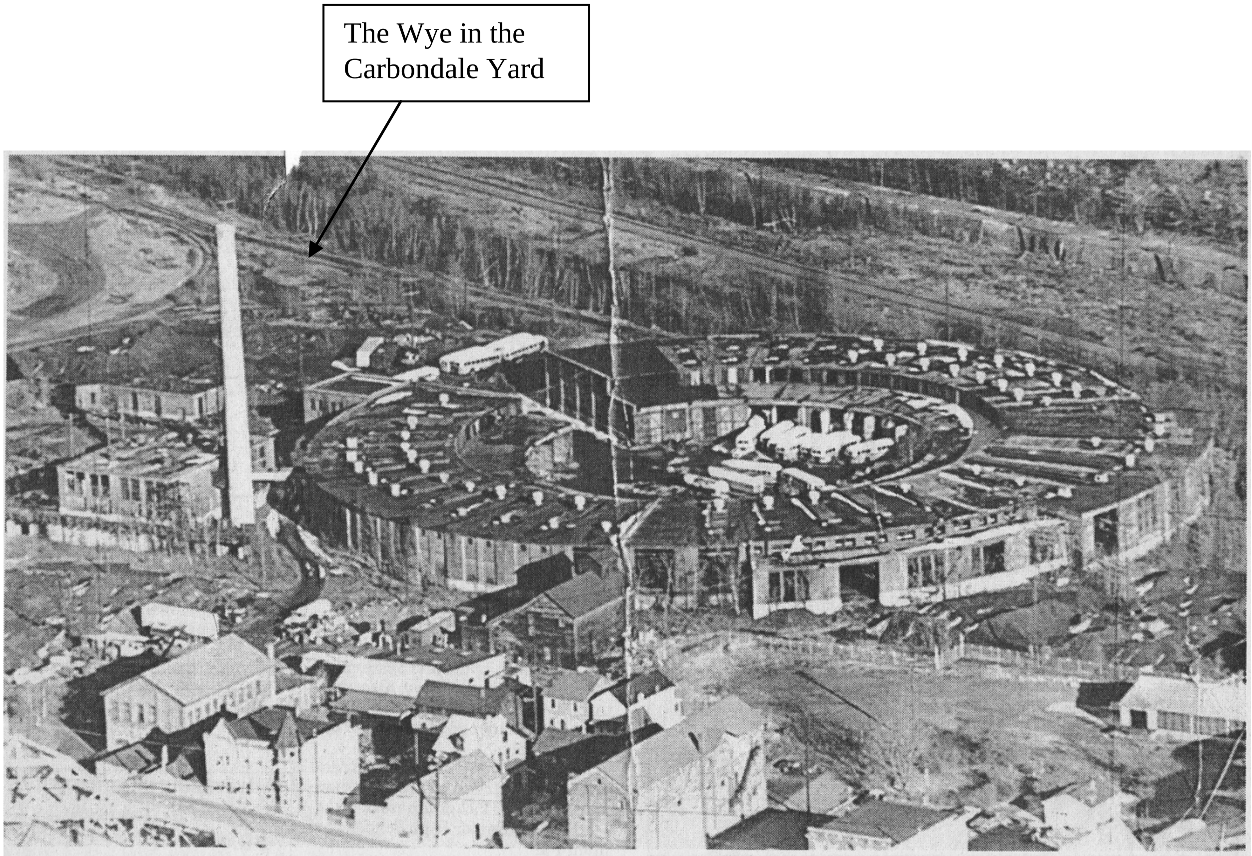
Additions for Volume XIV:

1. Dundaff Street Viaduct: “Two boys stand under the Dundaff Street viaduct on March 28, 1923 as it nears completion”. Photo courtesy of Frank Neutts. (newspaper clipping in the archives of the Carbondale Historical Society).



“Two boys stand under the Dundaff Street viaduct on March 28, 1923 as it nears completion”

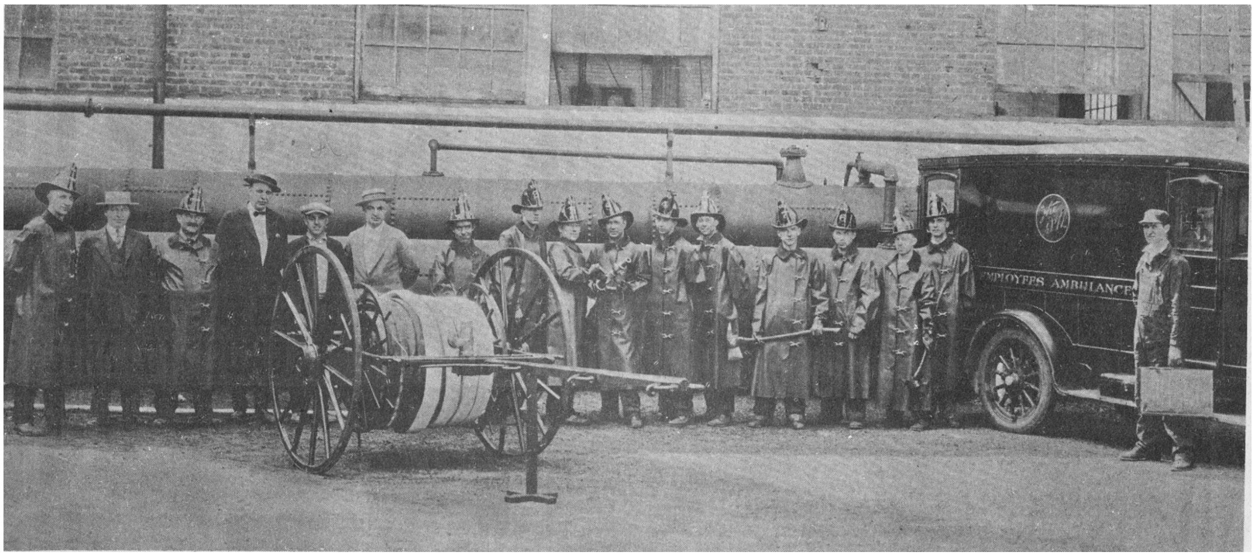
2. *Carbondale Roundhouse, 1950s.* Photograph published in the *Carbondale News.*



NOSTALGIA - This aerial photograph of the D&H Roundhouse from the 1950s shows the structure in state of disrepair. Buses can be seen parked in the center, and part of the Dundaff St. viaduct can be seen in the lower left corner. (Submitted by Anthony Talerico)

3. D&H Fire Department, 1925

The photograph given below of "D&H FIRE FIGHTERS, 1925" is from a newspaper clipping in the Marianne Stratford Collection of the Carbondale Historical Society.



D&H FIRE FIGHTERS, 1925 -- From left to right. Red Smith, Mike Carden, Pat Horan, W. B. Woolever, roundhouse foreman; Art Chabott, assistant roundhouse foreman; J. J. Brennan, master mechanic; Ambrose Taylor, Bernard Hogan, Vincent Walker, Gervase McDonough, Walter Fitch, Stanley Gibbs, Larry Hurl, Ernest Clark, Joe Coleman, Donald Stanton, Jack O'Neill, ambulance driver. (Photo loaned by Paul Clifford).

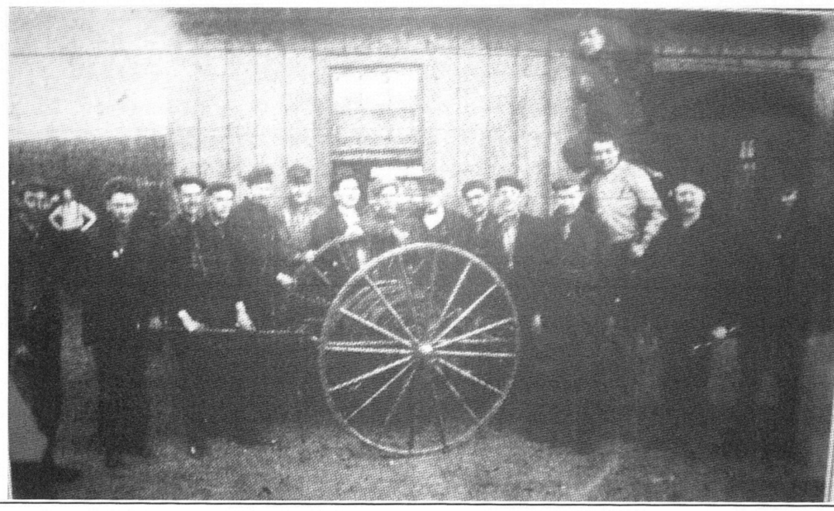
D&H FIREFIGHTERS, 1925—From left to right. Red Smith, Mike Carden, Pat Horan, W. B. Woolever, roundhouse foreman; Art Chabott, assistant roundhouse foreman; J. J. Brennan, master mechanic; Ambrose Taylor, Bernard Hogan, Vincent Walker, Gervase McDonough, Walter Fitch, Stanley Gibbs, Larry Hurl, Ernest Clark, Joe Coleman, Donald Stanton, Jack O'Neill, ambulance driver. (Photo loaned by Paul Clifford).

In *History of the Carbondale, PA Fire Department 1843-2015* by Joseph M. Klapatch (2016), the following information is presented on the D&H Fire Department on pp. 115-116:

DELAWARE AND HUDSON FIRE BRIGADE

An article in the January 19, 1905, issue of the *Carbondale Evening Leader* and the January 20, 1905, issue of *The Scranton Republican,* announced that the employees of the Delaware and Hudson Company local shops had formed a fire brigade. Ralph W. Blair was named chief of the brigade. Blair would be responsible for inspecting all hydrants, hose and fire extinguishers that would be placed in the shops. He would also exercise all rights in directing the men as head of the department. The brigade was the outcome of an idea of the company's new general foreman of the locomotive shops, Ross Kells.

The company was active around the beginning of the 1900's and appeared with their hose cart in Columbia Hose Company's 50th anniversary parade on September 4, 1906. On August 4, 1907, the company had their own celebration with a full day outing that included refreshments and a fine program of sports.



The Delaware and Hudson fire department photographed in 1911. Left to right is: William Richards, Timothy Lynady, Ernest Price, Edward Moffitt, Thomas Thomas, William Coon, M. J. Brennan (chief), James Connor, William Murray, Robert Tully, David Harvey, Henry Hart, Patrick Smith and James Coggins. Mark Brennan and Edward Kelly are on the ladder from bottom to top. (Scranton Republican photo)

On November 27, 1907, officers for the company were elected. They were: President Daniel Davis; Secretary H.J. Budd; Chief Thomas Smith and Fireman Timothy Lynady. At the time, the company was comprised of sixteen "well-drilled" members. At the meeting, Robert Tully and Timothy Lynady were named to head a committee to arrange for their twelfth annual banquet to be held on New Year's Day.

The company was called into service in July 1910, during a strike on the railroad. One of the box cars used by strike-breakers caught fire after one of the men carelessly threw a match onto a bed. The D & H Fire Brigade made quick work of the fire before any major damage could occur.

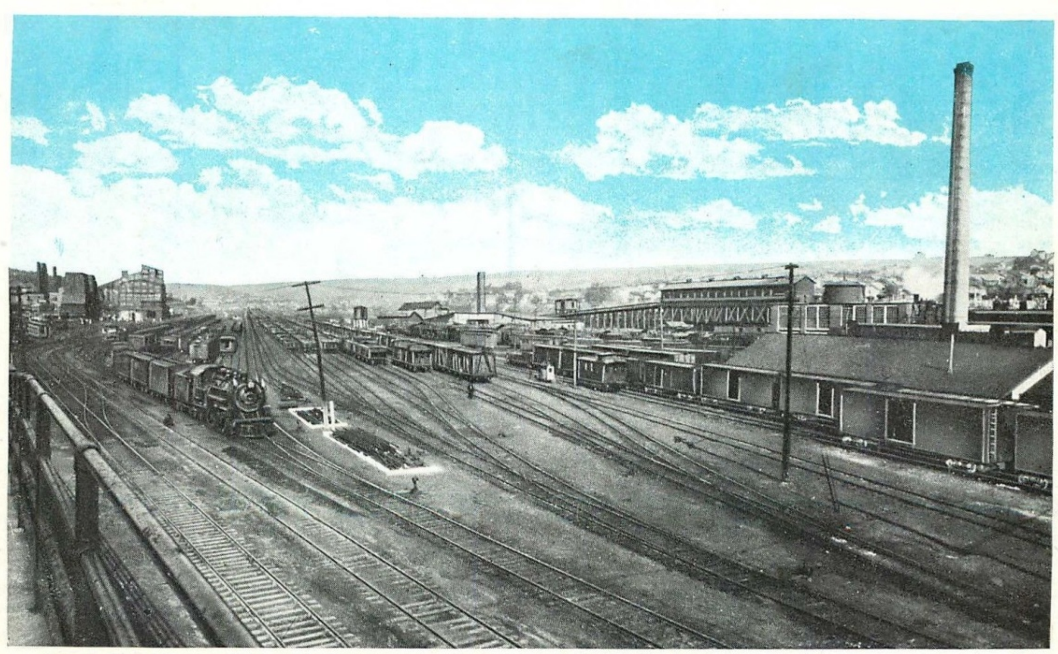
p. 116

The D & H Fire Brigade was also first on scene of a huge fire on March 13, 1921. The blaze hit the electric power plant at the Coalbrook Colliery of the Hudson Coal Company, causing 3500 mineworkers to become unemployed. The fire was spotted by the watchman around ten o'clock that night. Columbia and Mitchell Hose Companies were also on scene as they battled flames for an hour. Damage estimates neared $80,000. The plant furnished electricity to the Coalbrook, Wilson Creek, Powderly, No.1 and Jermyn collieries, as well as the Delaware and Hudson Railroad yards and offices in the city. There was fear that the watchman was burned to death in the fire but he was located after the fire, assisting firefighters.

On March 20, 1925, the fire brigade, called the Delaware and Hudson Emergency Fire Force, along with their apparatus was joined by the three city fire companies, under the direction of Fire Chief Sam Vail, to battle a huge fire. Around 6:45 pm, a fire broke out at the Carbondale Shops of the Delaware and Hudson Railroad. The blaze destroyed the machine and erecting shops and badly damaged four locomotives and valuable machinery stored inside the building. The fire was believed to have been started by combustion of oils and greases and left a loss of $250,000. William Machell, a fireman with the Mitchell Hose Company, was injured in the blaze when he fell into an ash pit, knocking him unconscious. He was taken to his home and treated by his family physician, regaining consciousness around 10 o'clock that evening.

4. Two views of the Carbondale D&H Yard, both sold on E-Bay

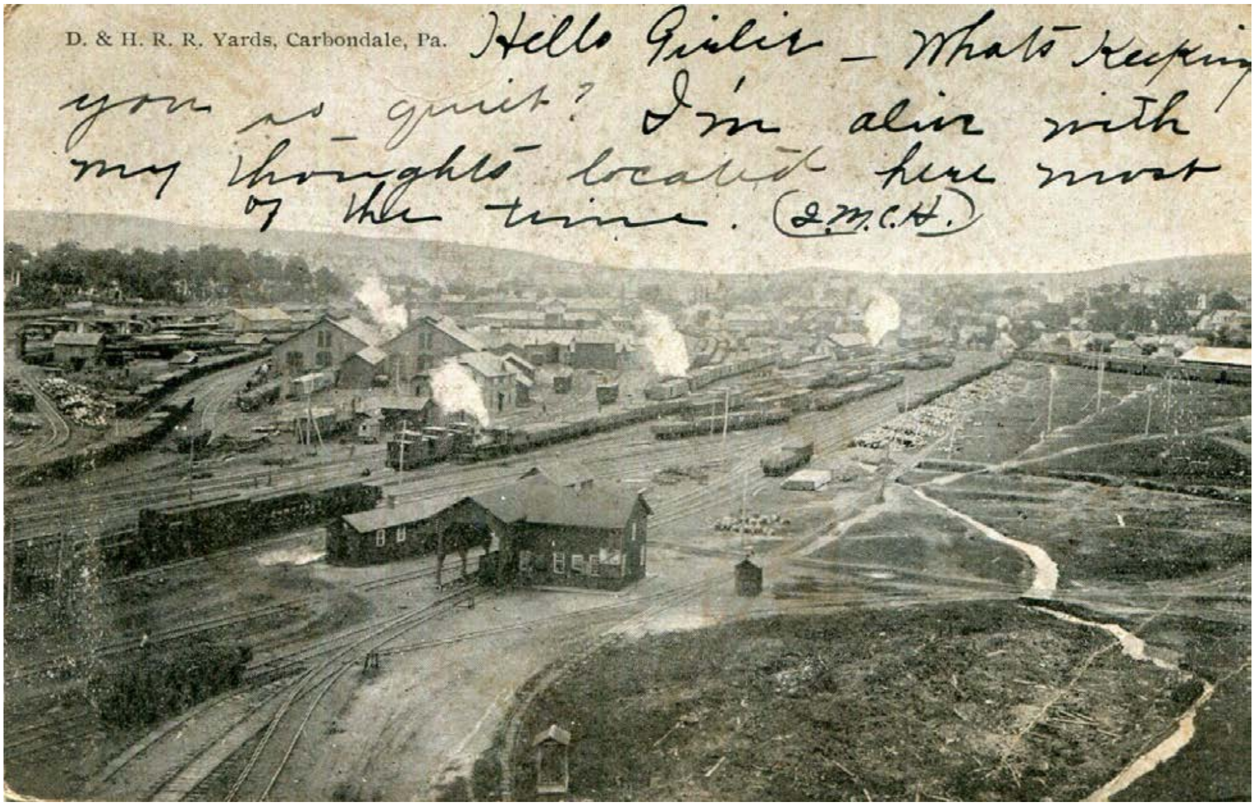
a. This one offered for sale on November 17, 2016:



D.& H. RAILROAD YARDS, SHOWING COALBROOK BREAKER, CARBONDALE, PA. BT-107196

"D. & H. Railroad Yards, Showing Coalbrook Breaker, Carbondale, PA." This photograph was taken from the viaduct, looking North, over the D&H Yards at Dundaff Street. This viaduct was installed in 1923-1924.

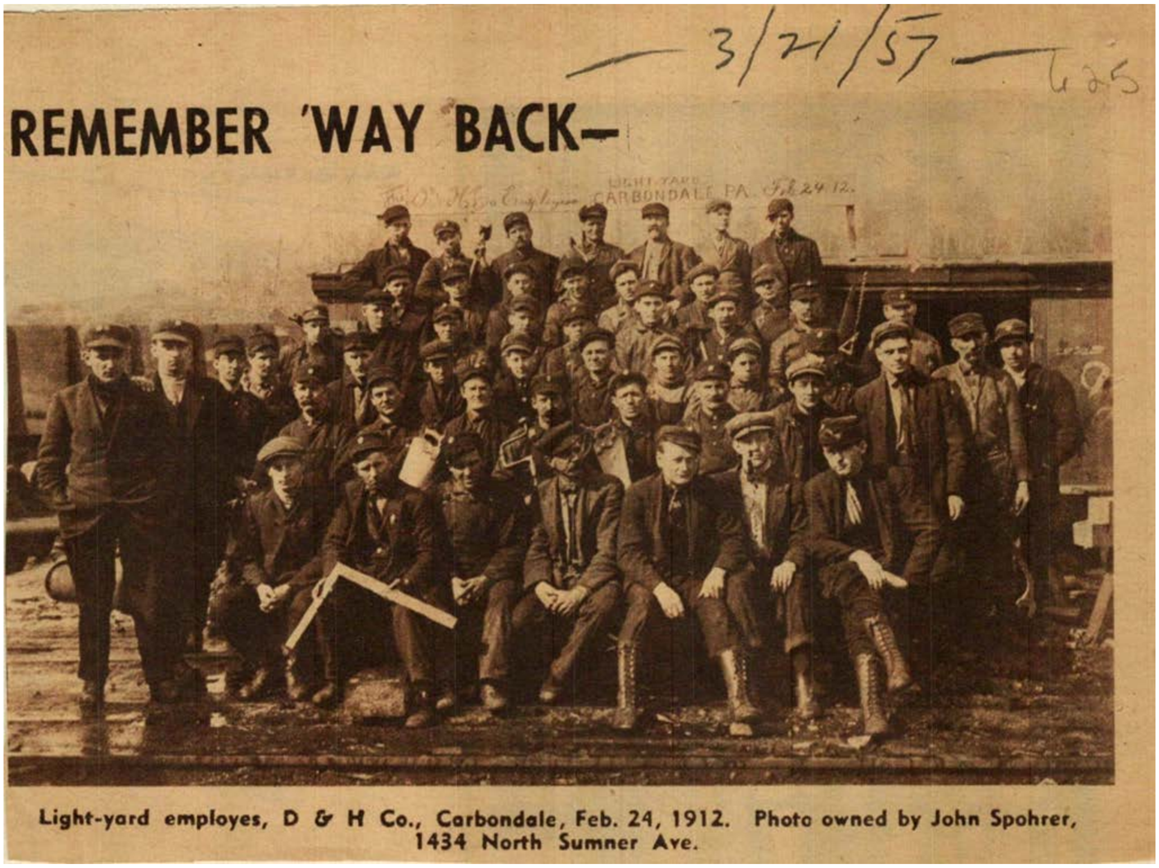
b. This card offered for sale on January 2, 2017:



"D. & H. R. R. Yards, Carbondale, Pa."

Reverse of the post card shown immediately above.

5. “Light-yard employes, D & H Co., Carbondale, Feb. 24, 1912”. Photo owned by John Spohrer, 1434 North Sumner Ave. Clipping (possibly from the *Scrantonian* of March 31, 1957), in the collection of the Lackawanna Historical Society.


— 3/21/57 — 625

REMEMBER 'WAY BACK—

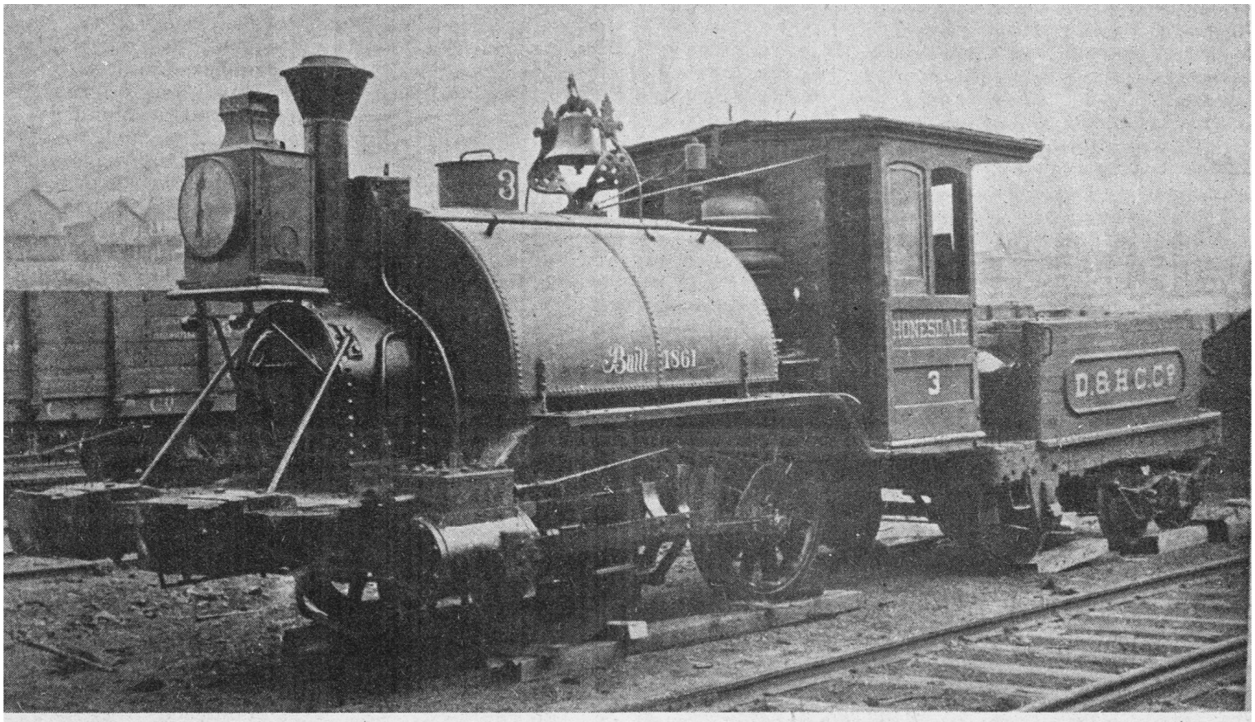
Light-yard employes, D & H Co., Carbondale, Feb. 24, 1912. Photo owned by John Spohrer, 1434 North Sumner Ave.

6. Photo titled *"D&H Railroad Office Force, September 1914,"* and dated September 1914. Original photo in the collection of Mrs. Warren Howell, Johnson City, NY

D&H Railroad Office Force, September 1914: (left to right): Fred Rhodes, George Kase (in left rear corner), Dave Buckley, Henry Saunders (standing), Louis Beck, Elmer Dix, Mr. Novack, Henry Tonkin, Harold Olver, and Wiltse Saunders. Original photo in the collection of Mrs. Warren Howell, Johnson City, NY

Additions for Volume XV

1. ***D&H No. 3, Honesdale:***



BUILT in 1861 -- This locomotive was built in the Carbondale Delaware and Hudson shops for service on the gravity railroad.

This newspaper clipping (from an unidentified local newspaper), showing the "Honesdale," is in the Marianne Stratford collection of the Carbondale D&H Transportation Museum. In the caption on the photograph, there is an error: the Honesdale was not made in the Carbondale Delaware and Hudson shops. It was made in 1861 by W. Cooke & Co., Scranton and was in service on the D&H until 1899.

2. ***D&H No. 1059***

D&H No. 1059 in the Carbondale D&H yard on September 10, 1913. The engineer, Joe Farrell is standing on the engine; the fireman, standing on the ground, is Maurice Walsh. This newspaper clipping is in the Marianne Stratford collection of the Carbondale D&H Transportation Museum.

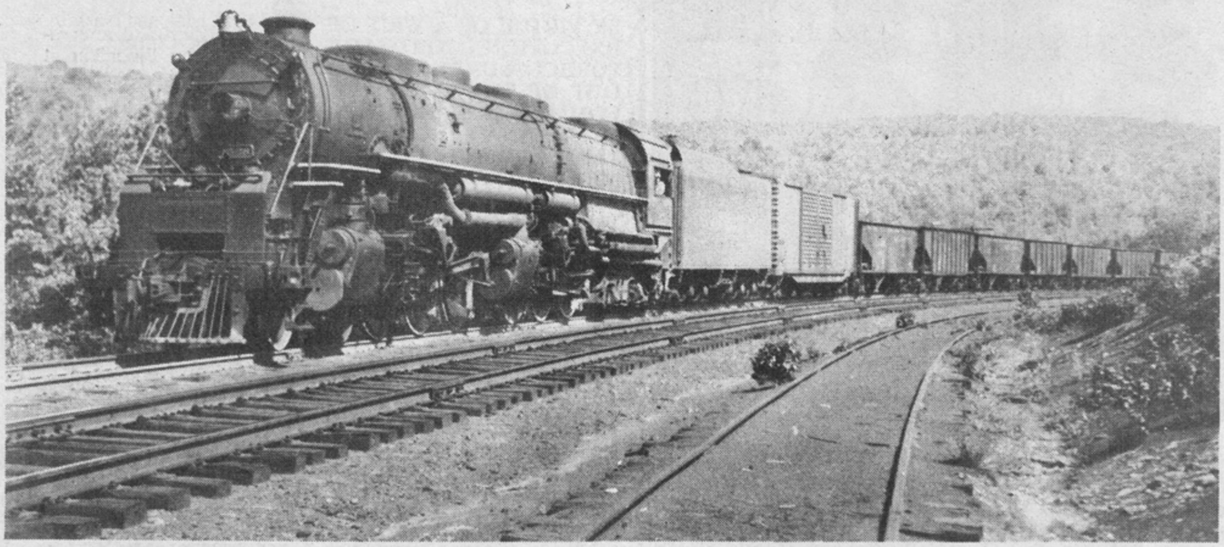
SEPT. 10, 1913 – Engineer Joe Farrell, formerly of Dundaff St., Carbondale, stands on engine of locomotive No. 1059 in the D & H Yards.

Fireman on the ground is Maurice Walsh, Belmont St. , Carbondale, husband of Mrs. Ruth Walsh Copeland and father of Carbondale Postmaster Joe Walsh and Jack Walsh, Waymart Coach Pat Walsh, and Robert Walsh, now living in Jersey City, N.J.

3. ***D&H No. 1528***

WEDNESDAY, MARCH 15, 1995 THE FOREST

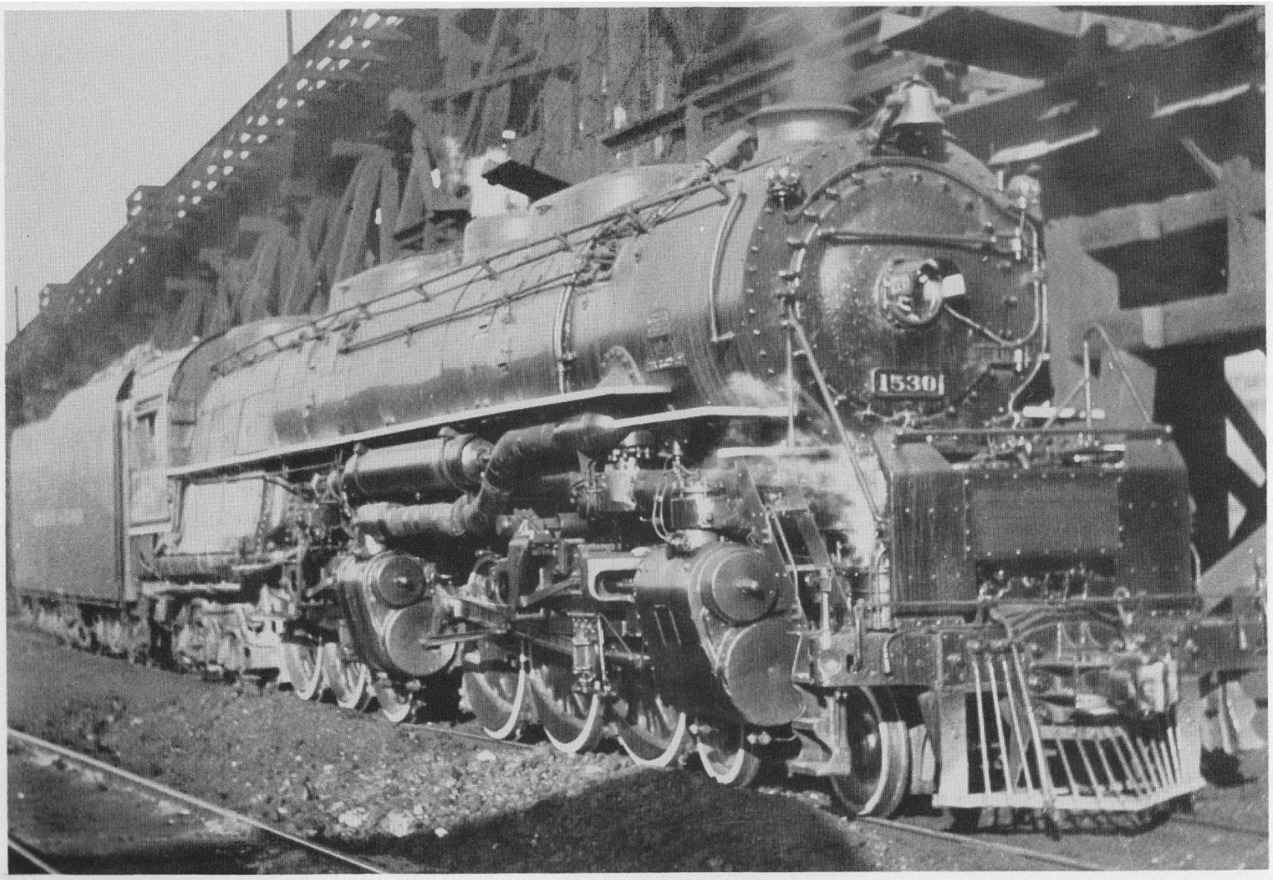
Remember When .....



It is a bright and sunny day in July of 1948 as a Delaware and Hudson railroad freight train led by one of the huge "1500's" steam locomotives, Challenger 4-6-6-4 No. 1528, heads north through Forest City. Making the climb up Ararat Mountain was a formidable one. Locomotives would drop sand on the rails for traction and to keep wheel slip to a minimum – that accounts for the lighter shade to the northbound track while the southbound in the foreground remains unshaded. D&H trains have been rerouted over the old Lackawanna Railroad line between Binghamton and Scranton since the 1980's. Locally, the rails have been ripped up and there is talk of making the right-of-way a scenic trail from Simpson to the upstate New York border. This view is from the new video of photo stills entitled "Steamers of the Delaware and Hudson Railroad" available for purchase from Tony Reznak Jr. Video Productions of P.O. Box 755, Wilkes-Barre, PA 18703-0755.

D&H No. 1528 on the Jefferson Branch, north of Forest City, July 1948. Photo from *Steamers of the Delaware and Hudson Railroad* by Tony Reznak, Jr. (as detailed in the caption above). This newspaper clipping, from the *Forest City News of* March 15, 1995, is in the Marianne Stratford collection of the Carbondale D&H Transportation Museum.

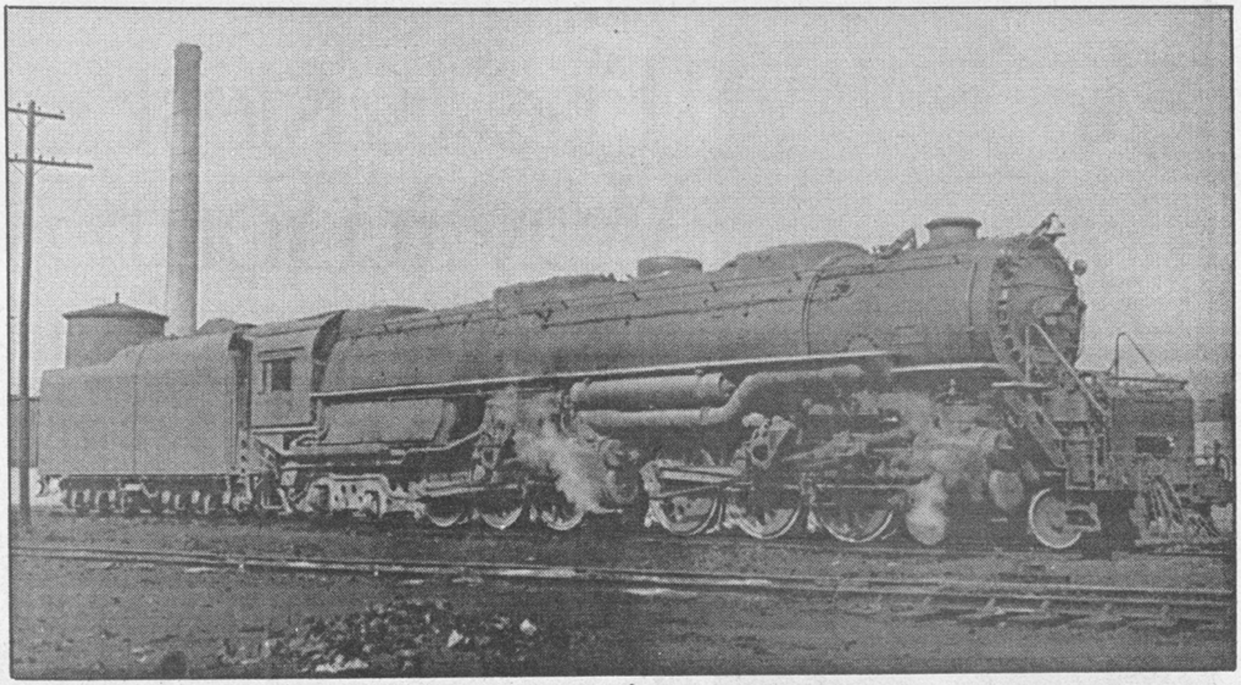
4. ***D&H No. 1530:***



Delaware & Hudson Challenger No. 1530 waits for its next assignment along the coal dock in the D&H Carbondale yard in 1950. The 4-6-6-4 will soon pull its heavy train over the Erie's steep grade to Ararat Summit and north to New York State. The D&H scrapped its Challengers in 1953 after only 11 years of active service. The line over Ararat was abandoned long after the D&H acquired the Erie's Jefferson Division, and the track was removed in 1983.
— William Farber

This photograph of D&H No. 150 heads the February page of the 1986 calendar produced by the Lackawanna & Wyoming Valley Chapter of the National Railway Historical Society. This photograph was made available for this calendar by William Farber.

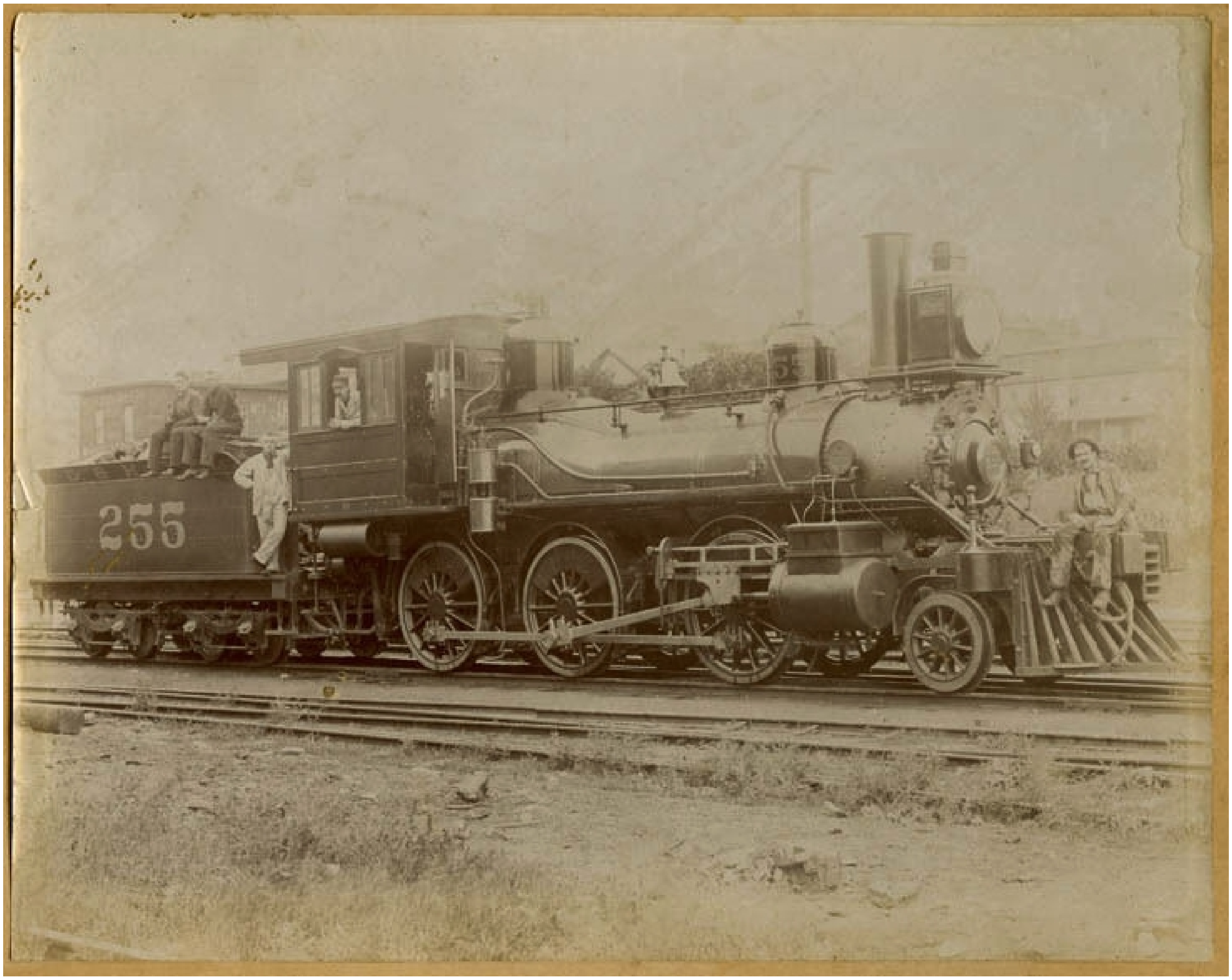
5. *D&H No. 1530 in the Carbondale Yard, May 1948.*



NOSTALGIA — In May 1948, the Delaware & Hudson Railroad 4-6-6-4 No. 1530 was in Carbondale Yard. In the background is the Roundhouse, water tower and one of Carbondale's long-time landmarks — the smokestack to the powerhouse of the railroad's Carbondale Yard facility. The 1530, as all other D&H steam locomotives, was scrapped in the 1950's. D&H trains have been rerouted over the old Lackawanna railroad mainline between Binghamton and Scranton since the 1980's. The rails north of Carbondale have been ripped up and the county owns and operates the line south to Scranton serving mid-valley businesses on a once prosperous right-of-way in place since before the Civil War. This view is from the new video of photo stills entitled "Steamers of the Delaware & Hudson Railroad," available for purchase from Tony Reznak Jr. Video Productions, P.O. Box 755, Wilkes-Barre, PA 18703-0755.

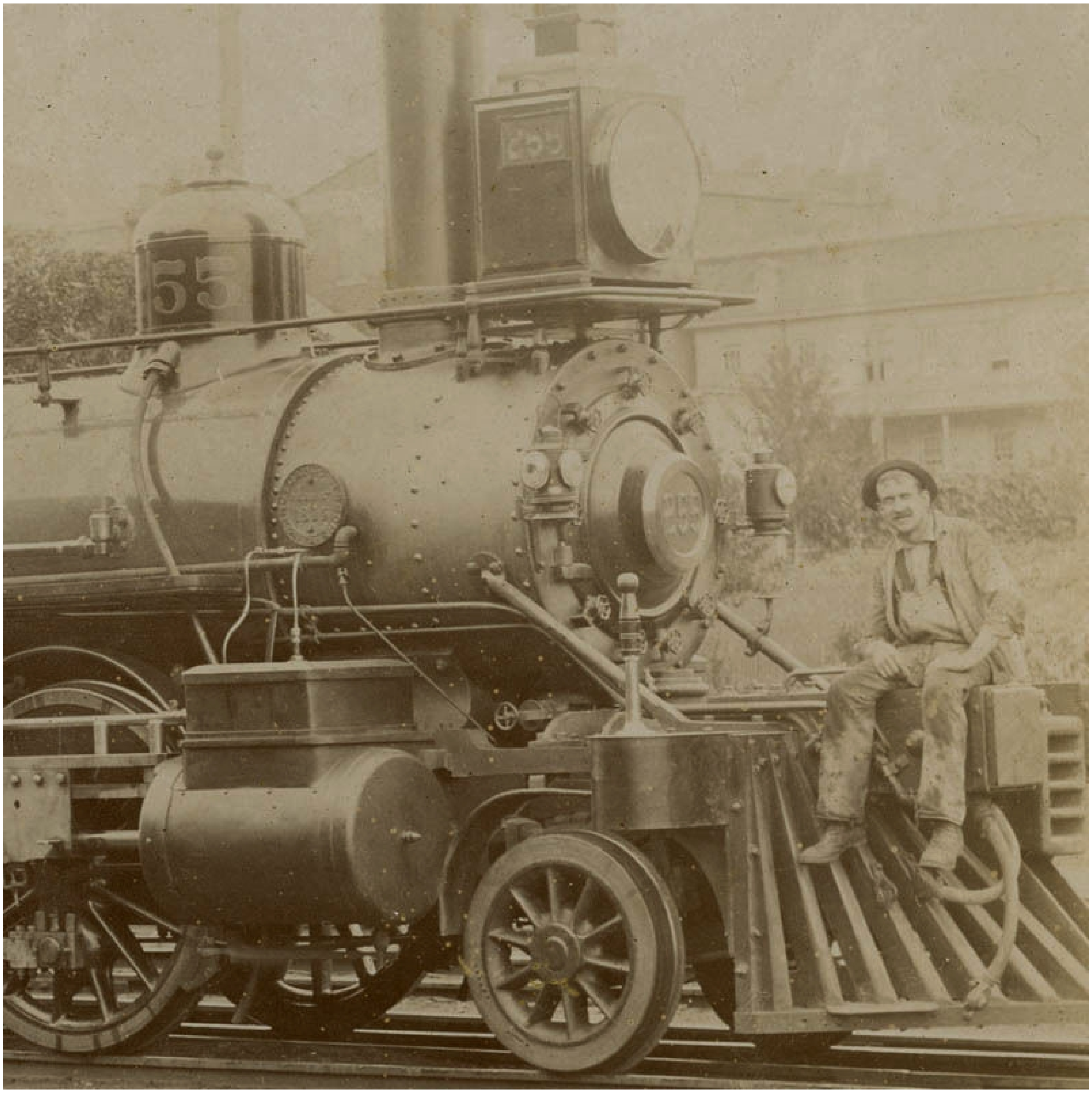
The photo of D&H No. 1530 in the Carbondale Yard in May 1948, shown here, is from *Steamers of the Delaware & Hudson Railroad* by Tony Reznak, Jr. This newspaper clipping is in the Marianne Stratford collection of the Carbondale D&H Transportation Museum.

6. This wonderful photograph of D&H No. 255 was offered for sale on E-Bay on December 9, 2016.



D&H No. 255

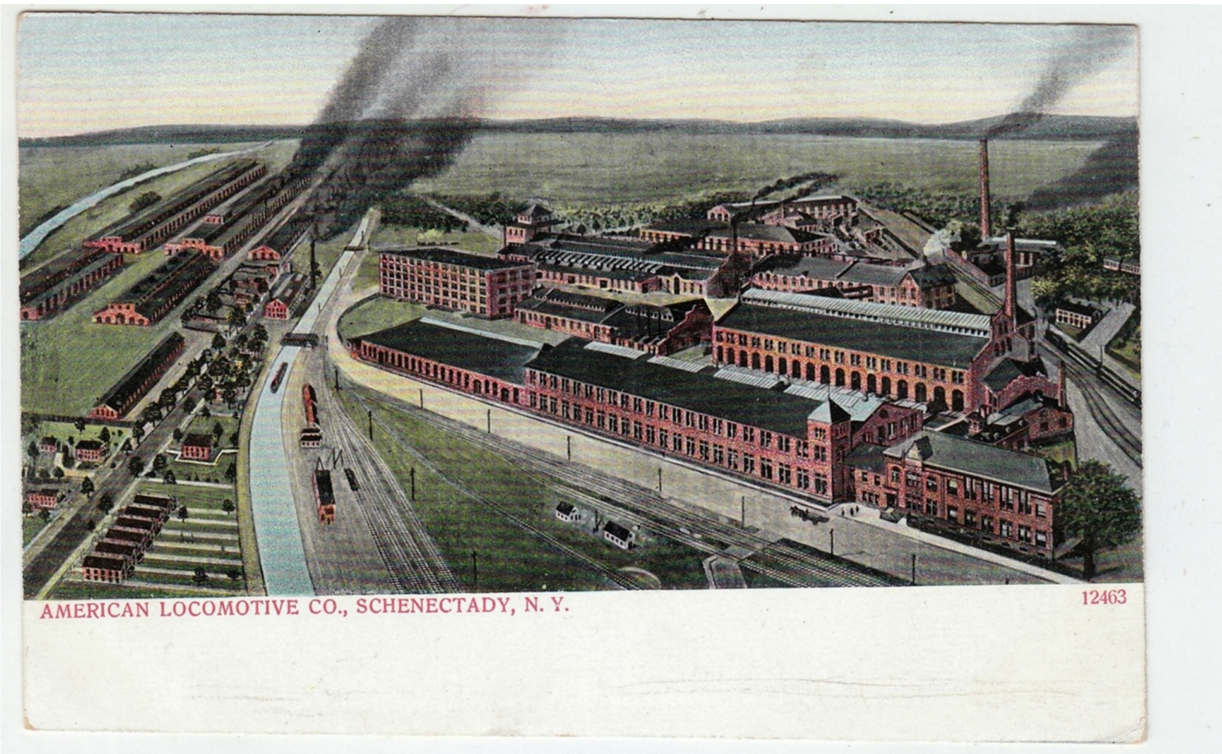
Here are three details of the photograph of No. 255 give above:


55


255

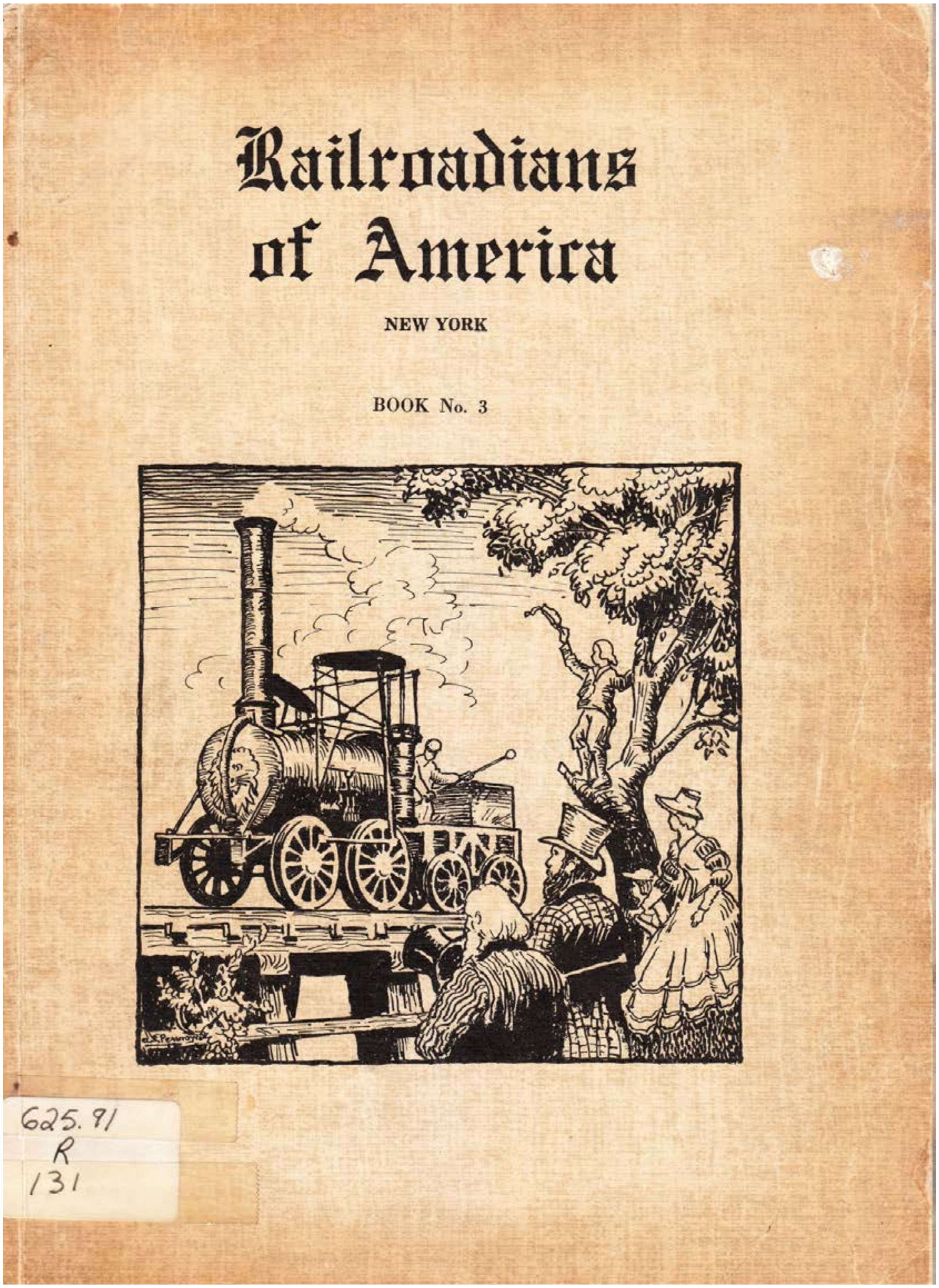
7. The American Locomotive Company, Schenectady, NY, where a great many D&H engines were made.

Post card in the collection of the Carbondale D&H Transportation Museum. Note: the image on the card is not square, which is why the caption on the card is crooked.



American Locomotive Co., Schenectady, N.Y.

8. *Railroadians of America, New York, Book 3,* pp. 51-94



Railroadians of America

NEW YORK

BOOK No. 3

AN illustrated record of the motive power and growth of the Delaware and Hudson railroad. Originally printed in two books published by the company entitled:

Motive Power on the Delaware and Hudson
The Delaware and Hudson Company
Board of Managers
Inspection of Lines
June 10th, to June 13th, 1926

and

Motive Power, Passenger Freight, and Work Equipment 1926-1936
The Delaware and Hudson Railroad Corporation
Board of Directors
Inspection of Lines
June 4th to June 7th, 1936

Reproduced by the kind permission of J. H. Nuelle, President, and G. H. Caley, General Manager, of The Delaware and Hudson Railroad Corporation. With additional material furnished by the railroad and the Railroadians of America.

Published by Railroadians of America, New York

PREFACE

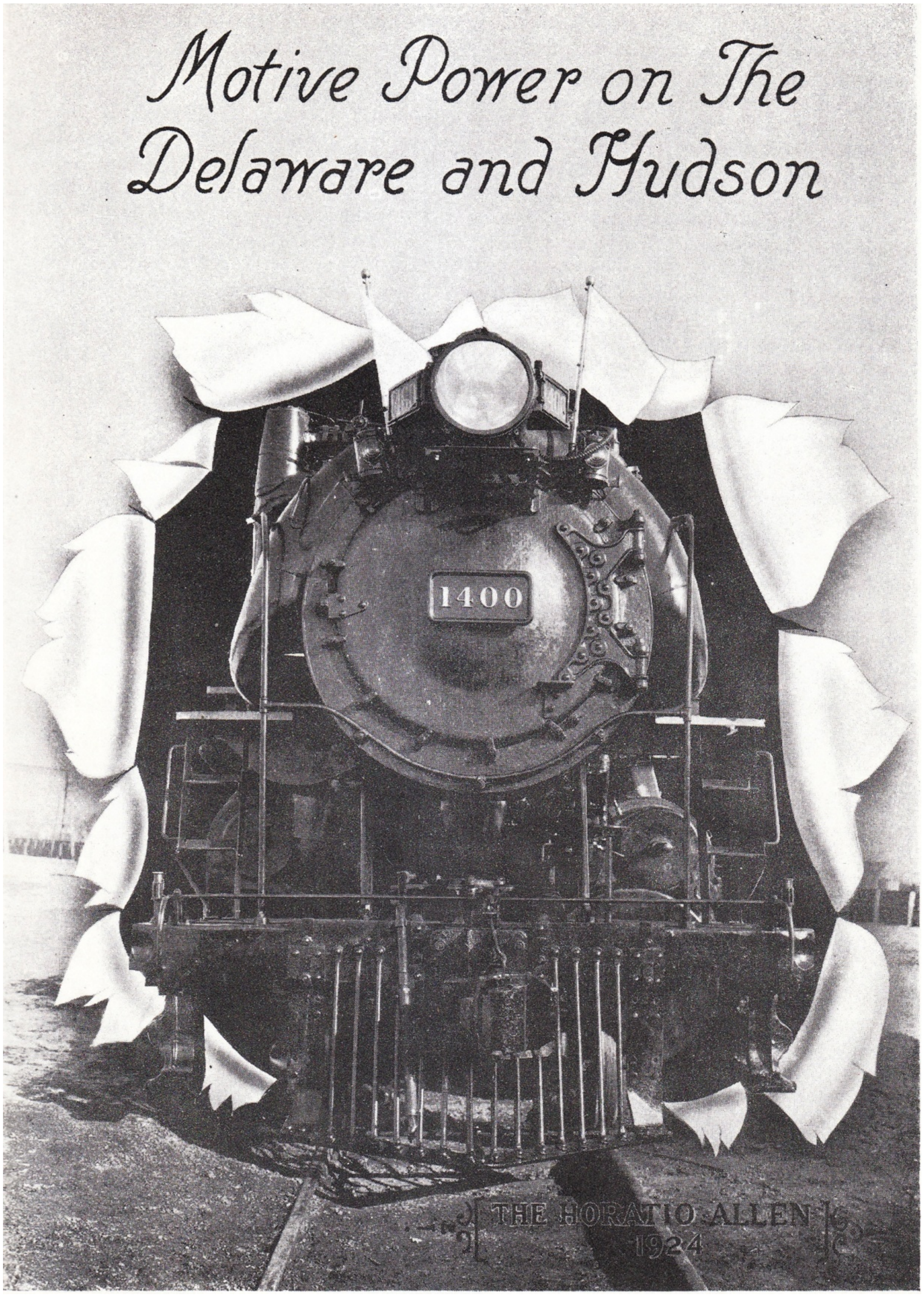
In presenting the third book to the members of the Railroadians of America we believe that it fulfills a desire of many of those whose interest lies in the development of motive power on American railroads. The historical part played by the Delaware and Hudson in the development of the locomotive is generally known and to further acquaint the stockholders with the details of this work the company published and distributed privately the following material. To this has been added numerous photographs and information that makes the record more extensive and brings the pictorial history of the motive power on the Delaware and Hudson up to date.

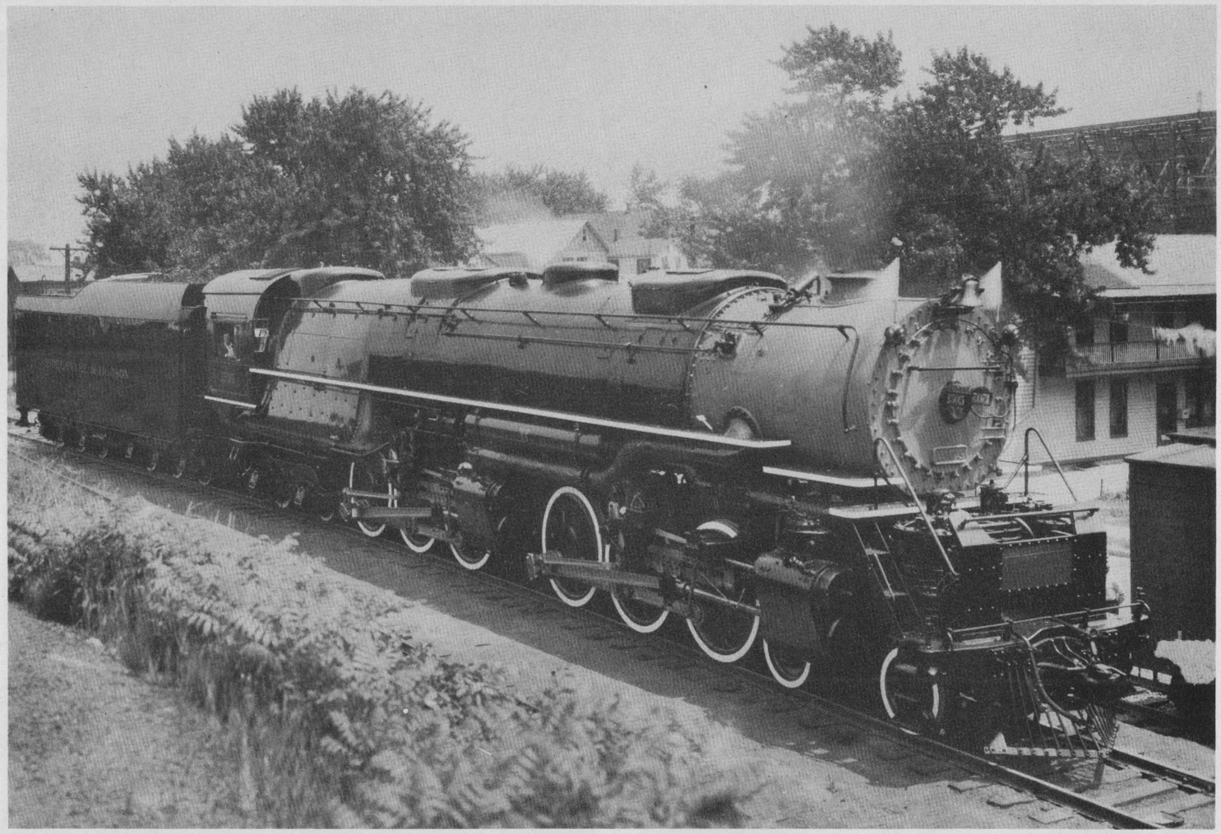
We wish to thank C. L. Winey for the loan of one of the books and G. H. Caley for the other which were combined to form the present volume.

The original chapters were compiled under the direction of G. S. Edmonds, Superintendent of Motive Power. The preface to these chapters states that it is surprising the comparatively little reliable information available regarding the early motive power in America. Failure to make records, or if made, but fragmentary; the loss or destruction of records; the passing of the pioneers, whose personal knowledge, unrecorded, lies buried with them, all combine to make the lot of the historian an unenviable one and the result of his efforts susceptible to criticism. Fully realizing these conditions an earnest endeavor has been made in compiling this work to make the subject matter presented as reliable as humanly possible.

Walter A. Lucas, Editor and Chairman,
Publication Committee, Railroadians
of America, 56 Tuxedo Avenue,
Hawthorne, N. J.

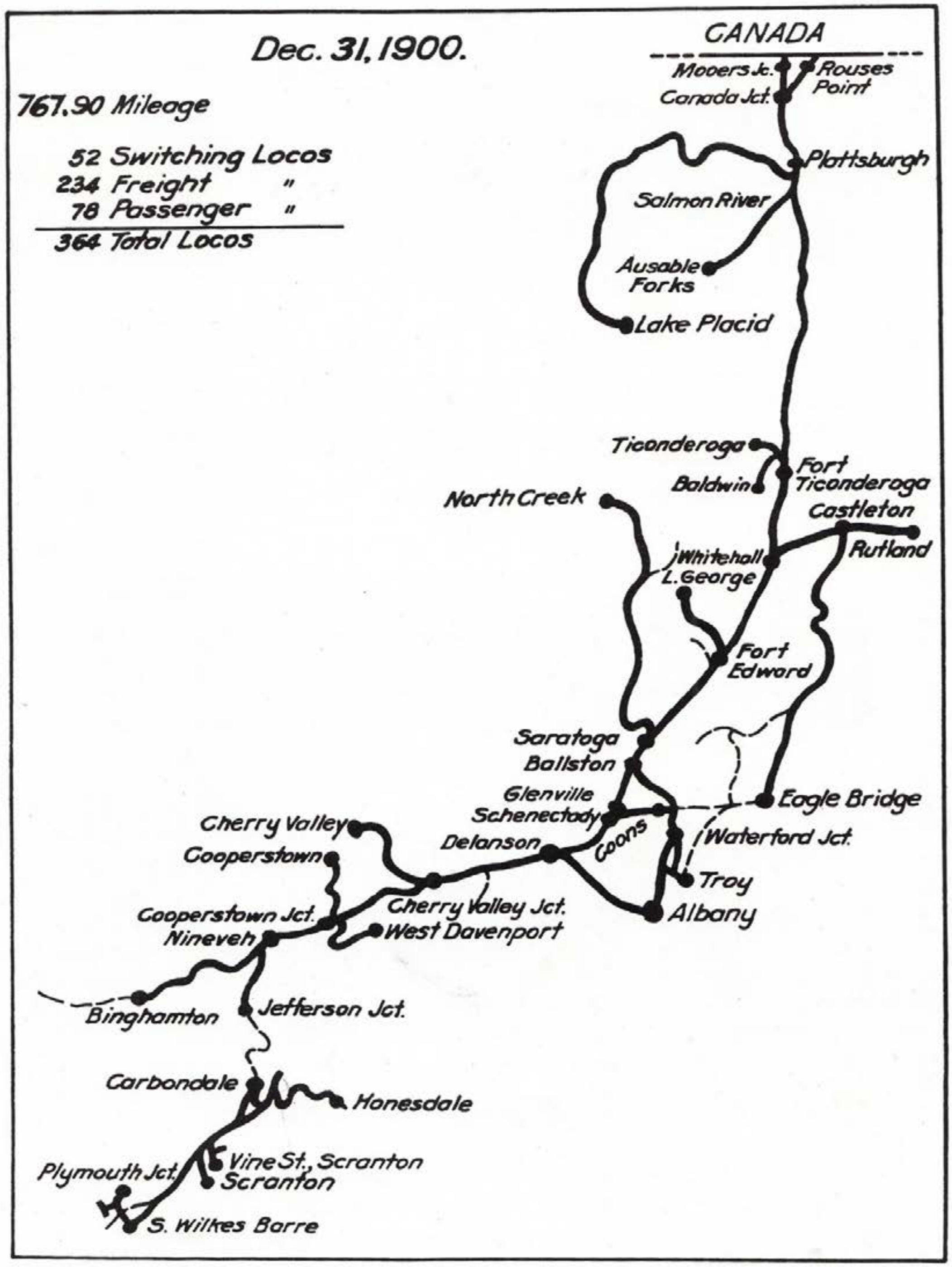
April 26, 1941.


Motive Power on The Delaware and Hudson
1400
THE HORATIO ALLEN
1924



Delaware and Hudson Locomotive 1505.

One of the twenty of the most powerful locomotives operating in the eastern part of the United States. They are the four cylinder simple articulated class with a 4-6-6-4 wheel arrangement. Cylinders, 20½″ by 32″. Drivers, 69″ diameter. Weight on drivers, 406500 pounds. Weight of total engine, 597000 pounds. Weight of tender, ⅔ load, 310200 pounds. Maximum tractive power, 94400 pounds. Tender capacity, 26 tons of soft coal, 22500 gallons of water. Locomotives 1500 to 1519 Railroad class J. Built by American Locomotive Company, Schenectady Works, July 1940.


Dec. 31, 1900.
767.90 Mileage
52 Switching Locos
234 Freight "
78 Passenger "
364 Total Locos
CANADA
Mooers Jc.
Rouses Point
Canada Jct.
Plattsburgh
Salmon River
Ausable Forks
Lake Placid
Ticonderoga
Fort Ticonderoga
Baldwin
North Creek
Castleton
Rutland
Whitehall
L. George
Fort Edward
Saratoga
Ballston
Glenville
Schenectady
Eagle Bridge
Waterford Jct.
Coons
Troy
Albany
Delanson
Cherry Valley
Cooperstown
Cherry Valley Jct.
Cooperstown Jct.
Nineveh
West Davenport
Binghamton
Jefferson Jct.
Carbondale
Honesdale
Plymouth Jct.
Vine St., Scranton
Scranton
S. Wilkes Barre

Period 1890 to 1900

Locomotives—364 *Mileage—767.90*

The major property development in this period was the building of the branch from Carbondale to Honesdale, Pa., some 27.62 miles, which was completed in 1899. The conditions obtaining in this respect were as follows:

Period 1890 to 1900 — Previous Development

RAILROAD	DATE OPENED	FROM	TO	OPERATED BY	MILEAGE TO DEC. 31ST.	
Saratoga& Schenectady RR.Co.	July 12, 1832-33	Schenectady	Saratoga	D. & H. Canal Co. (D&H. Co. since4-28-1899)	20.8	
Rensselaer & Saratoga RR. Co.	Oct. 6, 1835	Troy	Ballston	" " "	25.15	
Saratoga&WashingtonRR.Co.	1848	Saratoga	Whitehall	" " "	39.17	
Saratoga & Washington RR. Co.	Oct. 1, 1850	Whitehall	State Line	" " "	6.	
Rutland & Whitehall RR. Co.	Nov. 1, 1850	Castleton	State Line	" " "	6.79	
Saratoga & Washington RR. Co.	1851	Saratoga	Lake Station	" " "	40.00	
Plattsburg & Montreal RR.	July 26, 1852	Plattsburg	N. Y.—Canada Line	" " "	23.	
Albany & Vermont RR.	1852–53	Albany	Waterford Jct.	" " "	12.18	
Rensselaer & Saratoga RR. Co.	1852	Eagle Bridge	Rutland	" " "	62.46	
Plymouth & WilkesBarre RR. & Bridge Co.	1868	Plymouth	WilkesBarre	" " "	2.03	
Cooperstown & Susquehanna Valley R.R.	1869	Cooperstown Jct.	Cooperstown	Cooperstown& Charlotte Valley R.R. Co.	15.78	
Glens Falls RR. Co.	June 24, 1869	Ft. Edward	Glens Falls	D&H. Canal Co. (D&H. Co. Since 4-28-1899)	5.46	
New York & Canada RR. Co.	1870	Plattsburg	Rogers	" " "	21.	
Cherry Valley, Sharon & Albany RR. Co.	1870	Cherry Valley Jct.	Cherry Valley	" " "	21.04	
Albany & Susquehanna RR. Co.	1870	Albany	Binghamton	" " "	142.59	
Lackawanna & Susquehanna RR.	1871	Nineveh	Jefferson Jct.	" " "	22.01	
Adirondack Company	1871	Saratoga	North Creek	Adirondack RR. Co.	56.68	
Schenectady & Duanesburg	1871-72	Schenectady	Delanson	D&H. Canal Co. (D&H. Co. since 4-28-1899)	14.15	
D&H. Canal Co.—Northern Coal & Iron Co.	1871-86	Carbondale	WilkesBarre	" " "	35.39	
Rensselaer & Saratoga RR. Co.	1873	Troy	Green Island	" " "	.32	
New York & Canada RR. Co.	1875	Lake Station	Plattsburg	" " "	88.3	
New York & Canada RR. Co.	1875	Baldwin	Ft. Ticonderoga	" " "	4.77	
New York & Canada RR. Co.	1876	Canada Jct.	Rouses Point	" "	13.1	
D&H. Canal Co.	1877	Poplar Street	Br. in Scranton	" ' "	0.60	
Chateaugay RR. Co.	1879-80	Dannemora	Lyon Mt.	Chateaugay RR. Co.	17.	
D. & H. Canal Co.	1881	Glenville	Coons	D&H. Canal Co.	9.68	
Glens Falls RR. Co.	1882	Glens Falls	Lake George	D&H. Canal Co. (D&H. Co. since4-28-1899)	9.	—714.45

Development Period — 1890 to 1900

Cooperstown & Charlotte Valley RR. Co.	1891	Davenport Ctr.	Hemlocks	Cooperstown & Charlotte Vy. R.R.	4.25	
" "	1891	Cooperstown Jct.	Davenport Ctr.	" " "		
Ticonderoga RR.	1892	Ticonderoga Jct.	Ticonderoga	D& H. Canal Co. (D&H. Co. since 4-28-1899)	.92	
Cooperstown & Charlotte Valley RR. Co.	1893	Davenport Ctr.	West Davenport	Cooperstown & Charlotte Vy. RR. Co.	2.	
Saranac & Lake Placid RR. Co.	1893	Saranac Lake	Lake Placid	Saranac & Lake Placid RR. Co.	10.	
Northern Coal & Iron Co.	1894	Carbon St. Jct.	Lackawanna Ave.-Scranton	D& H. Canal Co. (D&H. Co. since 4-28-'99)	.51	
New York & Canada RR. Co.	1894	Rogers	Ausable Forks	" " "	2.7	
Northern Coal & Iron Co.	1894	Carbon St. Jct.	Scranton	" " "	.51	
D&H. Canal Co.	1899	Archbald	Bushwick	" " "	4.94	
D&H. Canal Co.	1899	Honesdale	Carbondale	" " "	27.62—	53.45
						767.90

During this period the Motive Power increased from three hundred thirty-two to three hundred sixty-four locomotives: Locomotives purchased and built at home shops in this decade are as follows:

Locomotives Furnished by Dickson Manufacturing Co.—Period 1890 to 1900

Railroad	No. of Locos.	Type	Cylinders	Diam. Drvrs.	Fuel	Total Weight Pound	Date Built	Firebox Length	Boiler Diam.	Tubes Diam.
D&H. Canal Co................	1	2–6–0	18"x24"	56¾"	Anthr.	105500	1891	10'3"	52"	2"
D&H. Canal Co................	2	4–4–0	18"x24"	62¼"	Anthr.	98500	1891	10'3"	52"	2"
D&H. Canal Co................	13	2–6–0	18"x24"	56¾"	Anthr.	108000	1891	10'3"	52"	2"
D&H. Canal Co................	2	0–6–0	17"x24"	51"	Anthr.	—	1891	8'	52"	2"
D&H. Canal Co................	4	2–6–0	18"x24"	62"	Anthr.	115000	1891	10'6"	54"	2"
D&H. Canal Co................	1	2–6–0	18"x24"	62"	Anthr.	123000	1891	10'6"	56"	2"
D&H. Canal Co................	7	2–6–0	18"x24"	62"	Anthr.	123000	1893	10'6"	56"	2"
D&H. Canal Co................	2	2–8–0	20"x24"	50"	Anthr.	—	1893	10'	60"	2"
D&H. Canal Co................	3	4–4–0	19"x24"	68½"	Anthr.	117000	1895	11'	58"	2"
D&H. Canal Co................	7	2–8–0	20"x26"	56"	Culm	140000	1898	10'	61"	2"
D&H. Canal Co................	6	2–8–0	21"x26"	56"	Culm	157000	1899	10'	65"	2"
D&H. Canal Co................	19	2–8–0	21"x26"	56"	Culm	157000	1900	10'	65"	2"

Locomotives Furnished by Schenectady Lomomotive Works—Period 1890 to 1900

Railroad	No. of Locos.	Type	Cylinders	Diam. Drvrs.	Fuel	Total Weight	Date Built	Firebox Length	Firebox Width	Boiler Diam.	Tubes Diam.
D&H. Canal Co........	3	4–4–0	19"x24"	68½"	Lump	128490	1895	11'	3'4⅜"	60"	2"
D&H. Company.......	6	2–8–0	22"x28"	50"	Culm	176000	1899	10'1"	9'	74"	2"
D&H. Company.......	16	2–8–0	21"x26"	56"	Culm	150800	1899	10'	8'1⅛"	65"	2"
D&H. Company.......	6	2–8–0	22"x28"	51"	Culm	176000	1899	10'	9	73"	2"
D&H. Company.......	10	2–8–0	21"x26"	56"	Culm	156000	1900	10'	8"	65"	2"

Locomotives Built by The Delaware and Hudson Canal Co.—Period 1890 to 1898

D&H. Canal Co........	9	4–4–0	19"x24"	68½"	Lump	112000	1897	10'8"	3'6"	57"	2"
D&H. Canal Co........	4	4–4–0	18"x24"	68"	Culm	115000	1898	9'6"	7'6"	54"	2"
D&H. Canal Co........	5	2–6–0	18"x24"	56½"	Culm	111636	1898	9'6"	7'6"	54"	2"
D&H. Canal Co........	3	2–8–0	20"x26"	56"	Culm	150100	1898	10'	8'	60"	2"

Locomotives Built by The Delaware and Hudson Company—Period 1899 to 1900

D&H. Company.......	2	4–4–0	18"x24"	68"	Culm	115000	1899	9'6"	7'6"	54"	2"
D&H. Company.......	2	4–4–0	19"x24"	68"	Culm	126200	1899	10'	8'	58"	2"
D&H. Company.......	2	4–4–0	19"x24"	68"	Culm	126200	1900	10'	8'	58"	2"
D&H. Company.......	4	4–4–0	19"x24"	68"	Culm	126200	1900	10'	8'	58"	2"
D&H. Company.......	2	2–8–0	21"x26"	56"	Culm	156000	1900	10'	8'6"	65"	2"

Marked and material changes were made in power conditions in this period. Locomotives purchased in 1891 were received with one hundred forty-five pounds boiler pressure, which was increased in 1895 to one hundred seventy pounds and in 1899 to one hundred eighty pounds. Tractive power of freight locomotives was increased from 16,900 pounds in 1891 to 41,450 pounds in 1899. Cylinders increased from eighteen by twenty-four to twenty-two by twenty-eight inches.

The "Consolidation" of the "Wooten" design, with center cab, became the accepted type of freight power.

The use of lump anthracite was replaced by straight pea coal as fuel on the newer types.

In 1895, realizing the urgent need of a passenger locomotive of increased power, three locomotives were purchased from the Dickson Manufacturing Co., and three from the Schenectady Locomotive Works, and competitively tried. The steam pressure was increased from the normal of one hundred forty-five to one hundred seventy pounds, the cylinders remaining nineteen by twenty-four inches.

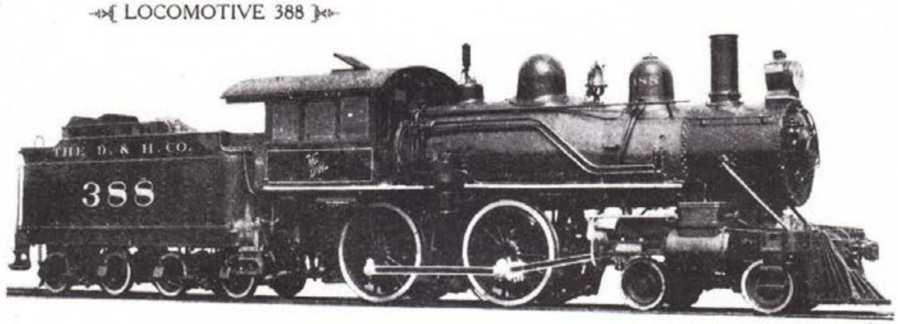
It is of more than passing interest, with the Schenectady locomotives, cast steel was very extensively used as a material, this marking its first application of moment made at these Works.

The boilers of these Schenectady locomotives were of the radial stayed type, which was their first introduction on the Delaware and Hudson, the Dickson locomotives having the conventional crown bar design.

The three Schenectady locomotives were used on the heavy passenger trains on the Saratoga and Champlain Divisions, and the Dickson on the Susquehanna Division, and performed very satisfactory service for a period of time.

Photographic cut is given of Locomotive No. 388, which was one of the three locomotives purchased from the Schenectady Locomotive Works for passenger service in 1895. This locomotive had cylinders nineteen by twenty-four inches; sixty-nine inch drivers; wagon top type boiler, fifty-nine inches in diameter with a pressure of one hundred seventy pounds; firebox eleven feet by three feet four and three-eighths inches; two hundred eighty-eight flues, eleven feet two inches long, two inches in diameter; wheel base rigid eight feet six inches, total twenty-three feet one inch; weights, on engine truck 38790 pounds, on drivers 89700 pounds, total 128490 pounds; total heating surface 1787 square feet; tractive power 18410 pounds; tender capacity, 4000 gallons and nine tons of coal. This type of power marked a material step in advancement in passenger power on the road.

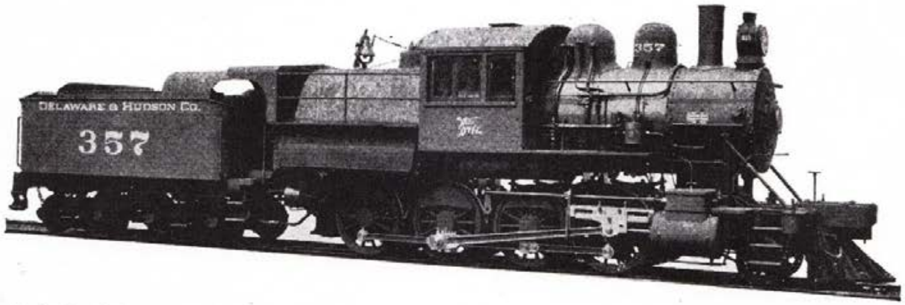
[LOCOMOTIVE 388]



Built by American Locomotive Company in 1895, Type 4-4-0. Gauge of Track 4′8½″. Cylinders, Diameter 19″, Stroke 24″. Driving Wheel Diameter 69″. Boiler, Wagon Top, Inside Diameter 59″, Pressure 170 Pounds. Fire Box, Length 11′, Width 3′4⅜″. Tubes 288, Diameter 2″, Length 11′2″. Wheel Base, Rigid 8′6″, Engine 23′1″, Engine and Tender 49′5″. Weight on Engine Truck 38790 Pounds, Drivers 89700 Pounds, Total Engine 128490 Pounds, Engine and Tender 214350 Pounds. Fuel, Anthracite. Heating Surface, Tubes 1655, Fire Box 132, Total 1787 Square Feet. Tractive Power 18410 Pounds. Tender Capacity, Water 4000 Gallons, Fuel 9 Tons.

Also photographic cut is given of the present class E-2, "Consolidation," number 357 built in 1899, at the Schenectady Locomotive Works, which locomotive had twenty-one inch by twenty-six inch cylinders; fifty-six inch drivers; fuel, culm; weight on drivers 131800 pounds, total 150800 pounds; firebox, length ten feet five-eighths inch, width eight feet six and one-eighth inches; boiler diameter sixty-five inches, with pressure of one hundred eighty pounds; flues, fourteen feet long, two inches in diameter; wheel base, sixteen feet rigid, and twenty-four feet two inches total. Tractive power 31850 pounds.

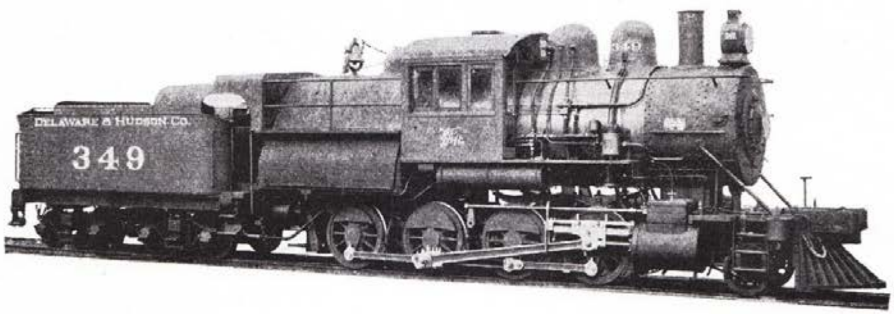
LOCOMOTIVE 357



Built by Schenectady Locomotive Works in 1899, Type 2-8-0. Cylinders, Diameter 21", Stroke 26". Drivers, Diameter 56". Fuel, Culm. Weight, on Drivers 131800 Pounds, Total 150800 Pounds. Fire Box, Length 10'5⅝", Width 8'6⅛". Boiler, Diameter 65", Pressure 180 Pounds. Flues, Length 14', Diameter 2". Wheel Base, Rigid 16', Total 24'2". Tractive Power 31850 Pounds.

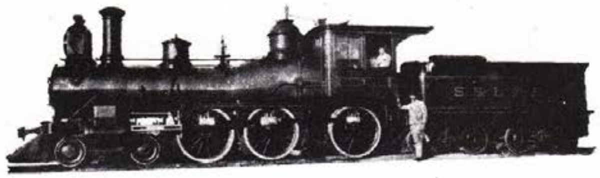
Illustration is also given of the E-4, E-4-A class, which were purchased for pusher service on Binghamton Hill. These locomotives had twenty-two inch by twenty-eight inch cylinders; fifty inch drivers; fuel, culm; firebox, length, ten feet one inch, width, nine feet; boiler, seventy-three inches in diameter, carrying one hundred eighty pounds of steam; flues, fourteen feet long, two inches in diameter; wheel base, rigid sixteen feet, total, twenty-four feet five inches. Tractive power 42300 pounds. It is of more than passing interest, in the period of 1920 to date, these locomotives will appear as converted switchers, the seven purchased, all having been rebuilt to back cab from center cab, and specially designed for this type of service.

LOCOMOTIVE 349



Built by Schenectady Locomotive Works in 1899, Type 2-8-0. Cylinders, Diameter 22", Stroke 28". Drivers, Diameter 50". Fuel, Culm. Fire Box, Length 10'1", Width 9'. Boiler, Diameter 73", Pressure 180 Pounds. Flues, Length 14', Diameter 2". Wheel Base, Rigid 16', Total 24'5". Tractive Power 42300 Pounds.

Photographic illustration is also given of the Saranac and Lake Placid Locomotive number "1," covering the light passenger, ten wheeler, of the period.

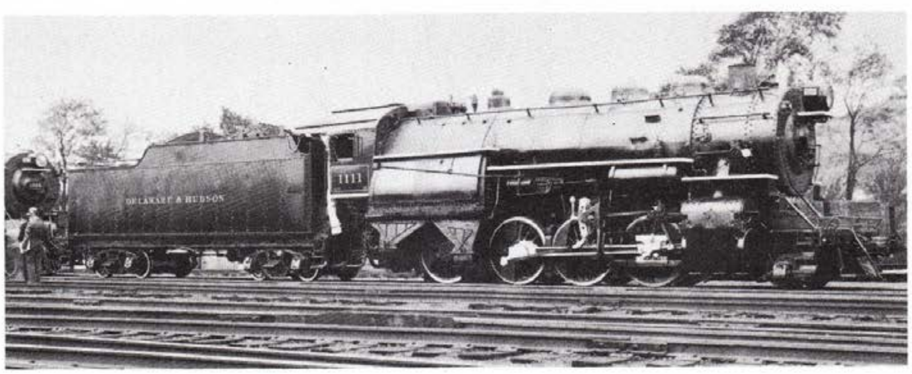


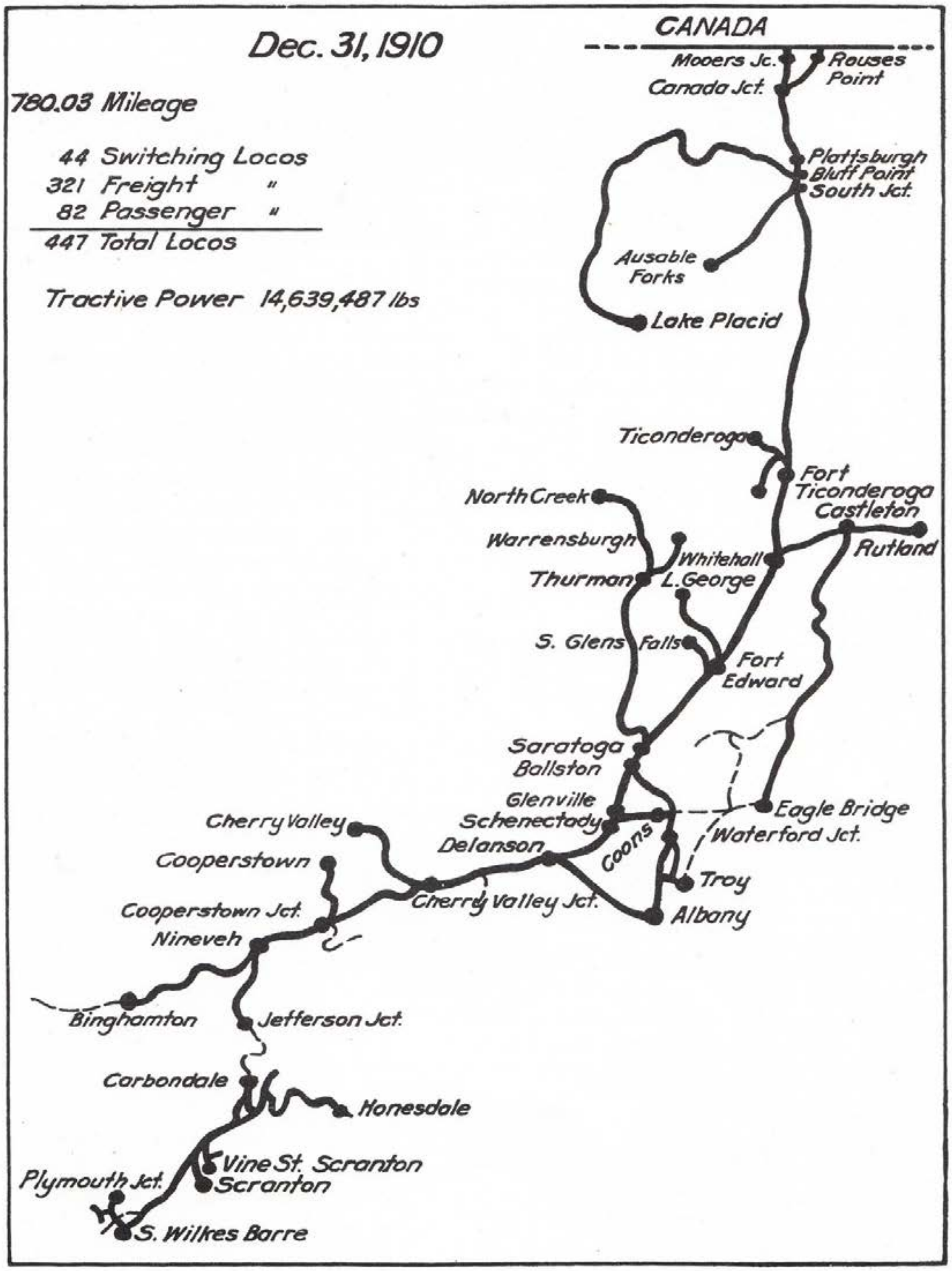
In general in America, this period marked the introduction of the first "Atlantic" type locomotive, which was built by the Baldwin Locomotive Works for the Atlantic Coast Line in 1895, which design provided for increased grate area with driving wheels of passenger diameter.

It was also the decade when much consideration was given to the problem of compounding of locomotives. Designs developed included the cross-compound having the high pressure cylinder on the one side and the low pressure on the other, in theory, the same as the "Horatio Allen," locomotive number 1400, also the "Tandem" compound and "Vauclain" compound. A very considerable number, involving this principle of the second expansion of the steam, were constructed. In the light of experience, it might be said they were somewhat in advance of the times. Today, other than in mallet service, their use is limited. Maintenance expense, with most types, was abnormal.

In or about 1903, the superheater began to receive serious consideration, and its development with consequent saving, attracted so much attention that the major portion of these locomotives were changed over from compound to simple cylinders.

It has been said, times change but fundamentals are with us forever. In principle, compounding is fundamental from an engineering standpoint and must ultimately receive serious attention on the part of designers. Had higher steam pressures, with superheating been co-related with these compounding experiments, who can question but that its history would have been differently recorded.




Dec. 31, 1910
780.03 Mileage
44 Switching Locos
321 Freight "
82 Passenger "
447 Total Locos
Tractive Power 14,639,487 lbs
CANADA
Mooers Jc.
Rouses Point
Canada Jct.
Plattsburgh
Bluff Point
South Jct.
Ausable Forks
Lake Placid
Ticonderoga
Fort Ticonderoga
Castleton
Rutland
North Creek
Warrensburgh
Whitehall
Thurman
L. George
S. Glens Falls
Fort Edward
Saratoga
Ballston
Glenville
Schenectady
Eagle Bridge
Waterford Jct.
Cherry Valley
Delanson
Coons
Troy
Cooperstown
Cherry Valley Jct.
Albany
Cooperstown Jct.
Nineveh
Binghamton
Jefferson Jct.
Carbondale
Honesdale
Vine St. Scranton
Scranton
Plymouth Jct.
S. Wilkes Barre

Period 1900 to 1910

Locomotives—447 *Mileage—780.03*

THE MAJOR roadway development in this period was the building of the Chateaugay Branch from Bluff Point to Lake Placid, some 79.44 miles, to wide gauge track and realignment, and the southbound track from Schenectady to Delanson. The conditions obtaining in this respect were:

Period 1900 to 1910 — Previous Development

RAILROAD	DATE OPENED	FROM	TO	OPERATED BY	MILEAGE TO DEC. 31ST.
					688.72—688.72
Development — Period 1900 to 1910					
So. Glens Branch	1901	Moreau Jct.	So. Glens Falls	D. & H. Co.	4.77
Chateaugay RR.	*1903	Bluff Point	Lake Placid	D. & H. Co.	79.44
Warrensburgh Branch	1905	Thurman	Warrensburgh	D. & H. Co.	3.40
Northern Coal & Iron Buttonwood Branch	1906	Connection with Plymouth	Branch—Buttonwood	D.& H. Co.	1.57
New York & Canada	1906	Rouses Point	NY—Canada Line	D.& H. Co.	1.11
Northern Coal & Iron Co.	1907	Plymouth No. 5 Branch		D. & H. Co.	1.02
D. & H. Co.	**1907	Schenectady	Delanson	D. & H. Co.	14.02— 91.31
					780.03

*Relocated, rebuilt and changed from narrow to standard gauge.
**New South-Bound Main Track.

During this period the Motive Power increased from three hundred sixty-four to four hundred forty-seven locomotives, purchases being made as follows:—

Built at The Delaware and Hudson Companys' Shops — Period 1900 to 1910

Railroad	No. of Locos.	Type	Cylinders	Diam. Drvrs.	Fuel	Total Weight	Date Built	Firebox Length	Firebox Width	Boiler Diam.	Tubes Diam.
D&H. Company.......	5	4-6-0	21"x26"	72"	Culm	175000	1904	9'11⅞"	8'6"	65"	2"

Locomotives Furnished by Dickson Manufacturing Company — Period 1900 to 1910

D&H. Company.......	5	2-8-0	21"x26"	56"	Culm	157000	1901	10'	—	66¼"	2"
D&H. Company.......	4	0-6-0	19"x24"	51"	Culm	130000	1902	8'5"	—	62"	2"

Locomotives Furnished by American Locomotive Company — Period 1900 to 1910

D&H. Company.......	4	2-8-0	21"x26"	56"	Culm	166000	1901	10'	8'6⅛"	65"	2"
D&H. Company.......	1	2-8-0	22"x28"	51"	Culm	177000	1901	10'1"	9'	73"	2"
D&H. Company.......	18	2-8-0	21"x30"	57"	Culm	187000	1902	10'	9'	73"	2"
D&H. Company.......	4	4-6-0	21"x26"	72"	Culm	175000	1903	9'11⅞"	8'6"	65"	2"
D&H. Company.......	16	2-8-0	21"x30"	57"	Culm	193000	1903	10'	9'	73"	2"
D&H. Company.......	14	0-6-0	19"x24"	51"	Culm	138000	1903	8'10"	8'	62"	2"
D&H. Company.......	6	4-4-0	20"x24"	69"	Culm	145500	1903	9'11 13/16"	8'	62"	2"
D&H. Company.......	4	4-6-0	21"x26"	69"	Culm	174000	1904	9'11⅞"	8'6"	65"	2"
D&H. Company.......	8	0-6-0	19"x24"	51"	Culm	138000	1904	8'10"	8'	62"	2"
D&H. Company.......	24	2-8-0	21"x30"	57"	Culm	193000	1904	10'	9'	73"	2"
D&H. Company.......	10	4-4-0	20"x24"	69"	Culm	145500	1904	9'11 13/16"	8'	62"	2"
D&H. Company.......	15	2-8-0	21"x30"	57"	Culm	183000	1905	10'	9'	73"	2"
D&H. Company.......	20	2-8-0	21"x30"	57"	Culm	201000	1906	10'	9'	73"	2"
D&H. Company.......	24	2-8-0	21"x30"	57"	Culm	201000	1906	10'	9'	73"	2"
D&H. Company.......	6	2-8-0	23"x30"	57"	Culm	246500	1906	10'6⅛"	9'6"	82"	2"
D&H. Company.......	5	0-6-0	19"x24"	51"	Culm	133000	1907	8'10"	8'	62"	2"
D&H. Company.......	13	4-6-0	21"x26"	63"	Culm	186500	1907	9'11⅞"	8'6"	65"	2"
D&H. Company.......	2	4-6-0	21"x26"	72"	Culm	191300	1907	9'11⅞"	8'6"	65"	2"
D&H. Company.......	12	2-8-0	23"x30"	57"	Culm	246500	1907	10'6⅛"	9'6"	82"	2"
D&H. Company.......	30	2-8-0	23"x30"	57"	Culm	252000	1907-8	10'6⅛"	9'6"	82"	2"
D&H. Company.......	6	0-8-8-0	26"x41"x28"	51"	Culm	451200	1910	10'6⅛"	9'6"	88"	2¼"

Marked material changes were made in power condition. Boiler pressure was increased to two hundred pounds in 1903, two hundred ten pounds in 1906 and two hundred twenty pounds in 1910.

In 1902 an increase was made in the power of the road freight locomotives by the purchase of eighteen outside admission piston valve cylinder, saturated, "Consolidations," having twenty-one by thirty inch cylinders, fifty-seven inch drivers, with a steam pressure of one hundred ninety pounds, tractive power of thirty-eight thousand eight hundred forty pounds. In 1903 sixteen of the same class, with slide valve cylinders, were purchased, other dimensions being similar.

In passenger service, the average coach on line in 1890 to 1900 weighed 55,500 pounds. This increased in the 1900 to 1910 decade to 81,300 pounds. The "Pullman" equipment increased from 108,116 pounds in 1895 to 122,380 pounds in 1905. This material increase in passenger train weight necessitated the development of new design of passenger power, and accordingly in 1903 the American Locomotive Company furnished six, type 4-4-0, having twenty by twenty-four inch cylinders, sixty-nine inch drivers, steam pressure of one hundred ninety pounds, tractive power twenty-two thousand eight hundred pounds. Also four, type 4-6-0, having twenty-one by twenty-six inch cylinders, seventy-two inch drivers, steam pressure two hundred pounds, with a tractive power of twenty-seven thousand four hundred fifty pounds. These locomotives had the "Wooten" type boiler with middle cab, designed to burn small sizes of anthracite. Their performance was, and has continued to be, very creditable.

There was also purchased in this period a materially larger switching locomotive of the 0-6-0 type having nineteen by twenty-four inch cylinders; fifty-one inch drivers; steam pressure, one hundred eighty pounds, with a tractive power of twenty-six thousand five hundred ten pounds. They also had the "Wooten" type boiler with center cab, designed to burn small anthracite.

The next major change in freight power development was in 1906 when six freight locomotives, type 2-8-0, having twenty-three by thirty inch cylinders; fifty-seven inch drivers, tractive power of 49,690 pounds; steam pressure of two hundred ten pounds, were purchased. They also had the "Wooten" type boiler with center cab, designed to burn small anthracite, pea coal being the general fuel of this period. It is of interest to note these locomotives marked the first introduction on the property of the "Walschaert" gear, which had been introduced into America in 1904 on some "Mallet" type locomotives for the Baltimore & Ohio Railroad, by Mr. L. F. Loree, at that time their President. This gear thereafter became the prevailing type of the road.

The year 1907 is notable in that it marks the introduction of the "Wooten" type boiler with the cab at the rear rather than the center of the boiler, which had been the accepted previous practice.

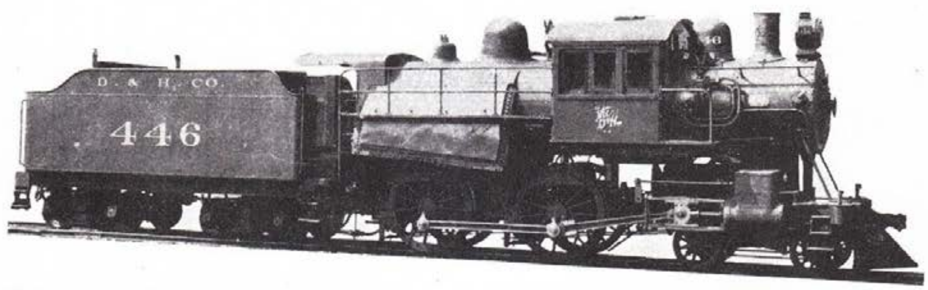
Two 4-6-0 type passenger locomotives were purchased, the only material difference from the 1903 locomotives being the changed location of cab.

There was also purchased in this year forty-two freight locomotives of general dimensions, the same as the 1906 type, with the exception that thirty were equipped with the cab at the back of the boiler.

In 1910 six compound "Mallet" locomotives, 0-8-8-0 type, were purchased, having twenty-six by forty-one by twenty-eight inch cylinders; fifty-one inch drivers, tractive power, simple 142,000 pounds and compound 107,700 pounds; steam pressure, two hundred twenty pounds; rear cab, designed to burn small size of anthracite. These locomotives were purchased as pushers from Carbondale to Ararat and have since continued to perform satisfactory service in the territory.

Cut illustrations are given of the "446", type 4-4-0, road classification "G-5," first purchased in 1903. This class of locomotive had twenty by twenty-four inch cylinders; sixty-nine inch drivers; straight top, sixty-two inch diameter boiler, carrying one hundred ninety pounds steam; firebox, nine feet eleven and thirteen-sixteenths inches long by eight feet wide; wheel base, rigid, eight feet six inches; engine total wheel base, twenty-three feet six inches; weight on engine truck 52,000 pounds, on drivers 93,500 pounds; total engine 145,500 pounds; engine and tender 259,000 pounds; heating surface 2,215 square feet; tractive power 22,800 pounds.

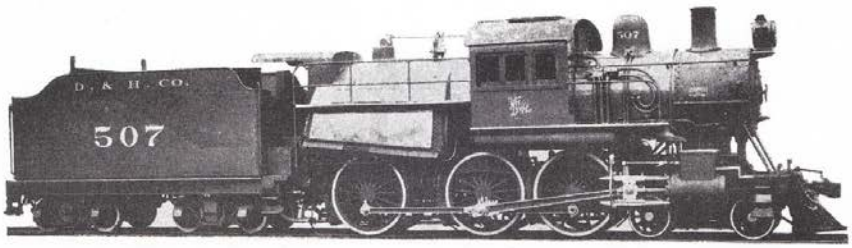
LOCOMOTIVE 446



Built by American Locomotive Company in 1903, Class G-5. Gauge of Track 4′8½″. Cylinders, Diameter 20″, Stroke 24″. Driving Wheel Diameter 69″. Boiler, Diameter 62″, Pressure 190 Pounds. Firebox, Length 9′11 13/16″, Width 96″. Tubes, 301, Diameter 2″, Length 12′6″. Wheel Base, Driving 8′6″, Engine 23′6″, Engine and Tender 51′10¾″. Weight in Working Order, Leading 52000 Pounds, Driving 93500 Pounds, Engine 145500 Pounds, Engine and Tender 259000 Pounds. Fuel, Anthracite. Heating Surface, Total 2215 Square Feet. Tractive Power 22800 Pounds. Tender Capacity, Water 6000 Gallons, Fuel 8 Tons.

Also locomotive "507," type 4-6-0, road classification "D-3," representative of the type, series 500 to 508 inclusive, purchased from the American Locomotive Company in 1903. This class of locomotive had twenty-one by twenty-six inch cylinders; seventy-two inch drivers; straight top boiler sixty-five inches in diameter, carrying two hundred pound steam pressure; firebox nine feet eleven and seven-eighth inches long by eight feet six inches wide; wheel base rigid fifteen feet, total engine being twenty-six feet four inches; weight on engine truck 43,500 pounds, on drivers, 131,500 pounds, total engine 175,000 pounds, total engine and tender 295,166 pounds. Heating surface 2663.72 square feet. Tender capacity 6500 gallons of water and 12 tons of coal. Tractive power 27,450 pounds.

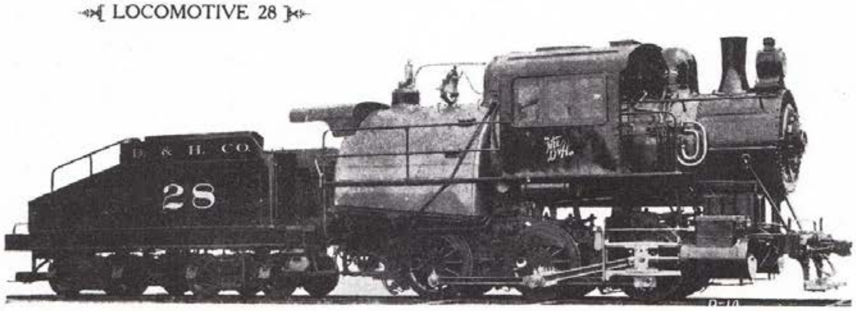
LOCOMOTIVE 507



Built by American Locomotive Company in 1903, Class D–3. Gauge of Track 4′8½″. Cylinders, Diameter 21″, Stroke 26″. Driving Wheel Diameter 72″. Boiler, Diameter 65″, Pressure 200 Pounds. Fire Box, Length 9′11⅞″, Width 8′6″. Tubes 308, Diameter 2″, Length 15′0″. Wheel Base, Driving 15′0″, Engine 26′4″, Engine and Tender 54′1¼″. Weight in Working Order, Leading 43500 Pounds, Driving 131500 Pounds, Engine 175000 Pounds, Engine and Tender 295166 Pounds. Fuel, Anthracite. Heating Surface, Total 2663.72 Square Feet. Tractive Power 27450 Pounds. Tender Capacity, Water 6500 Gallons, Fuel 12 Tons.

Also locomotive number 28, type 0-6-0, road classification "B-4," having nineteen by twenty-four inch cylinders; fifty-one inch drivers; straight top boiler, sixty-two inches in diameter, carrying one hundred eighty pounds steam; firebox eight feet six inches long by eight feet wide; wheel base engine twelve feet eight inches; weight on drivers 136,000 pounds, and total weight engine and tender 228,150 pounds; heating surface 1778.62 square feet; tractive power 26,510 pounds.

LOCOMOTIVE 28

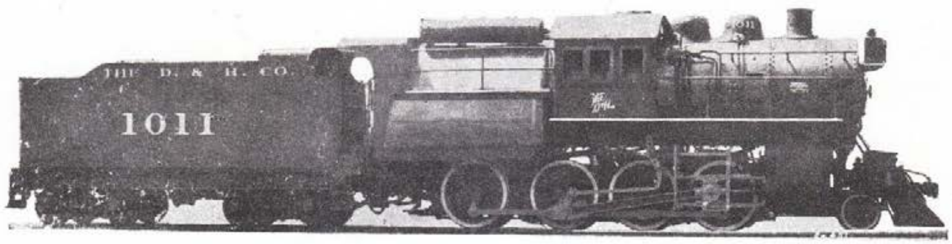


Built by American Locomotive Company in 1902, Class B–4. Gauge of Track 4′8½″. Cylinders, Diameter 19″, Stroke 24″. Driving Wheel Diameter 51″. Boiler, Diameter 62″, Pressure 180 Pounds. Fire Box, Length 102″, Width 96″. Tubes 269, Diameter 2″, Length 11′5¼″. Wheel Base, Driving 12′8″, Engine 12′8″, Engine and Tender 40′0″. Weight in Working Order, Driving 136000 Pounds, Engine 136000 Pounds, Engine and Tender 228150 Pounds. Fuel, Hard Coal. Heating Surface, Total 1778.62 Square Feet. Tractive Power 26510 Pounds. Tender Capacity, Water 4000 Gallons, Fuel 6 Tons.

Illustration is also given of locomotive "1011," road classification "E-5," having twenty-three by thirty inch cylinders; fifty-seven inch drivers; straight top boiler, eighty-two inches in diameter, with a pressure of two hundred ten pounds; firebox ten feet six and one eighth inches long by nine feet six inches wide; wheel base rigid seventeen feet, engine twenty-five feet eleven inches; weight on engine truck 29,000 pounds, on

drivers 217,500 pounds, total engine 246,500, engine and tender 399,300 pounds; heating surface 3968 square feet; tender capacity 7800 gallons of water and 14 tons of coal; tractive power 49,690 pounds.

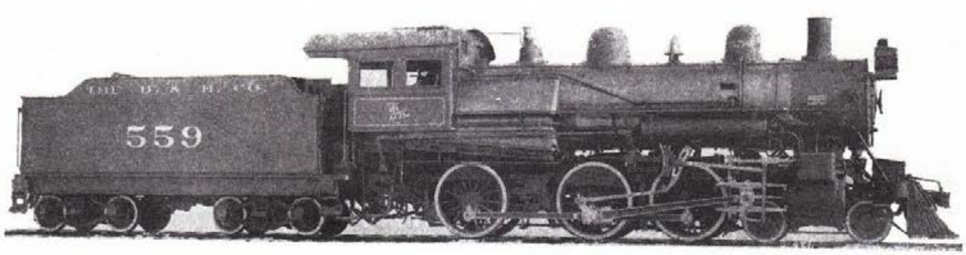
LOCOMOTIVE 1011



Built by American Locomotive Company in 1906, Class E–5. Gauge of Track 4′8½″. Cylinders, Diameter 23″, Stroke 30″. Driving Wheel Diameter 57″. Boiler, Diameter 82″, Pressure 210 Pounds. Fire Box, Length 126⅛″, Width 114″. Tubes 493, Diameter 2″, Length 14′6″. Wheel Base, Driving 17′0″, Engine 25′11″, Engine and Tender 57′7¾″. Weight in Working Order, Leading 29000 Pounds, Driving 217500 Pounds, Engine 246500 Pounds, Engine and Tender 399300 Pounds. Fuel, Fine Anthracite. Heating Surface, Total 3968 Square Feet. Tractive Power 49690 Pounds. Tender Capacity, Water 7800 Gallons, Fuel 14 Tons.

Also locomotive "559," type 4-6-0, road classification "D-3," having twenty-one by twenty-six inch cylinders; sixty-three inch drivers; straight top boiler, sixty-five inches in diameter, carrying two hundred pounds steam pressure; firebox nine feet eleven and seven eigth inches long by eight feet six inches wide; wheel base rigid fifteen feet, engine twenty-six feet five inches; weight on engine truck 46,000 pounds, on drivers 143,000, total engine 189,000 pounds, engine and tender 333, 500 pounds; heating surface 2583.9 square feet; tender capacity 6800 gallons water and 14 tons of coal; tractive power 31,440 pounds. This locomotive in 1912 had drivers increased to seventy-two inches in diameter, reducing tractive power to 27,450 pounds, and in 1922 had piston valve cylinders applied bringing back the tractive power to 30,150 pounds.

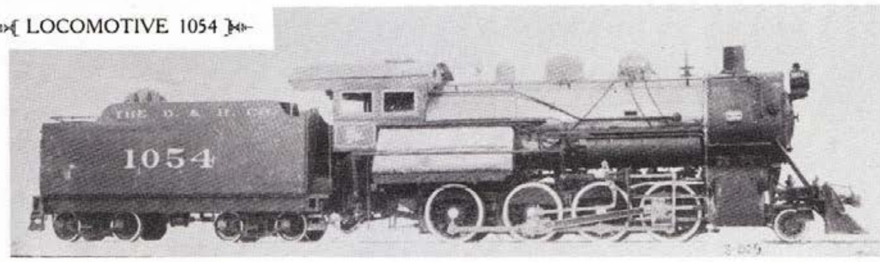
LOCOMOTIVE 559



Built by American Locomotive Company in 1907, Class D–3. Gauge of Track 4′8½″. Cylinders, Diameter 21″, Stroke 26″. Driving Wheel Diameter 63″. Boiler, Diameter 65″, Pressure 200 Pounds. Fire Box, Length 119⅞″, Width 102″. Tubes 308, Diameter 2″, Length 15′0″. Wheel Base, Driving 15′0″, Engine 26′5″, Engine and Tender 59′0″. Weight in Working Order, Leading 46000 Pounds, Driving 143000 Pounds, Engine 189000 Pounds, Engine and Tender 333500 Pounds. Fuel, Fine Anthracite. Heating Surface, Total 2583.9 Square Feet. Tractive Power 31440 Pounds. Tender Capacity, Water 6800 Gallons Fuel 14 Tons.

Also locomotive "1054," type 2-8-0, road classification "E-5," having cylinders twenty-three by thirty inches; fifty-seven inch drivers; straight top boiler, eighty-two inches in diameter, carrying a pressure of two hundred ten pounds; firebox, ten feet six and one-eighth inches long by nine feet six inches wide; wheel base, rigid seventeen feet, engine twenty-five feet eleven inches; weights, on engine truck 28,000 pounds, on drivers 222,000 pounds, total engine 250,000 pounds, engine and tender 402,000 pounds; heating surface 3968 square feet; tender capacity, 7800 gallons of water and 14 tons of coal; tractive power 49,690 pounds.

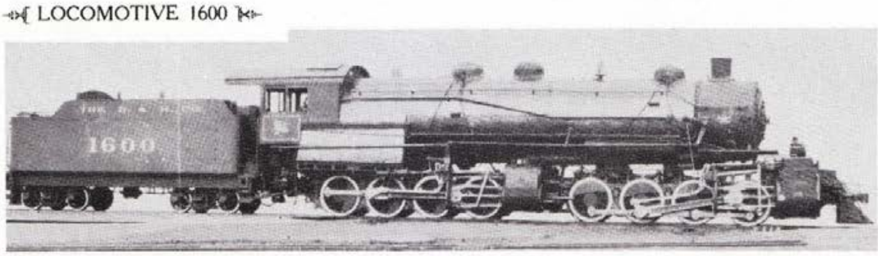
LOCOMOTIVE 1054



Built by American Locomotive Company in 1907, Type 2–8–0. Gauge of Track 4'8½". Cylinders, Diameter 23", Stroke 30". Driving Wheel Diameter 57". Boiler, Straight Top, Inside Dimensions 82", Pressure 210 Pounds. Fire Box, Length 10'6⅛", Width 9'6". Tubes 493, Diameter 2". Length 14'6", Wheel Base, Rigid 17', Engine 25'11", Engine and Tender 59'9¼". Weight, on Engine Truck 28000 Pounds, Drivers 222000 Pounds, Total Engine 250000 Pounds, Engine and Tender 402000 Pounds. Fuel, Culm. Heating Surface, Tubes 3716, Fire Box 252, Total 3968 Square Feet. Tractive Power 49690 Pounds. Tender Capacity, Water 7800 Gallons, Fuel 14 Tons.

Also illustration is given of locomotive "1600," type 0-8-8-0, road classification "H," having cylinders twenty-six by forty-one by twenty-eight inches; fifty-one inch drivers; straight top boiler, eighty-eight inches in diameter, carrying two hundred twenty pounds of steam; firebox ten feet six and one-eighth inches long by nine feet six inches wide; wheel base, rigid fourteen feet nine inches, engine forty feet two inches; weights, on drivers 445,000, total engine 445,000 pounds, engine and tender 611,800 pounds; heating surface 6627 square feet; tender capacity 9000 gallons of water and 14 tons of coal; tractive power 107,700 pounds compound and 142,000 pounds simple.

LOCOMOTIVE 1600



Built by American Locomotive Company in 1910, Type 0–8–8–0. Gauge of Track 4'8½". Cylinders, HP. Diameter 26", Stroke 28", LP. Diameter 41", Stroke 28". Driving Wheel Diameter 51". Boiler, Straight Top, Inside Diameter 88", Pressure 220 Pounds. Fire Box, Length 10'6⅛", Width 9'6". Tubes 446, Diameter 2¼", Length 24'. Wheel Base, Rigid 14'9", Engine 40'2", Engine and Tender 75'7¼." Weight, on Drivers 445000 Pounds, Total Engine 445000 Pounds, Engine and Tender 611800 Pounds. Fuel, Bituminous. Heating Surface, Tubes 6277, Fire Box 350, Total 6627 Square Feet. Tractive Power 107700 Pounds Compound, 142000 Pounds Simple. Tender Capacity, Water 9000 Gallons, Fuel 14 Tons.

In America this period marks in 1901 the introduction of the first "Pacific" type locomotive, which was built by the Baldwin Locomotive Works for the New Zealand Government Railways, which has become the prevailing accepted type for medium heavy passenger service.

In 1904, Mr. L. F. Loree, President of the Baltimore & Ohio Railroad, had built by the American Locomotive Company, the first "Mallet" type of locomotive used in the United States. It was exhibited at the Louisiana Purchase Exposition the same year. This locomotive was of the 0-6-6-0 type and weighed somewhat in excess of one hundred fifty tons, probably the largest locomotive of its day in America. It was of the compound type.

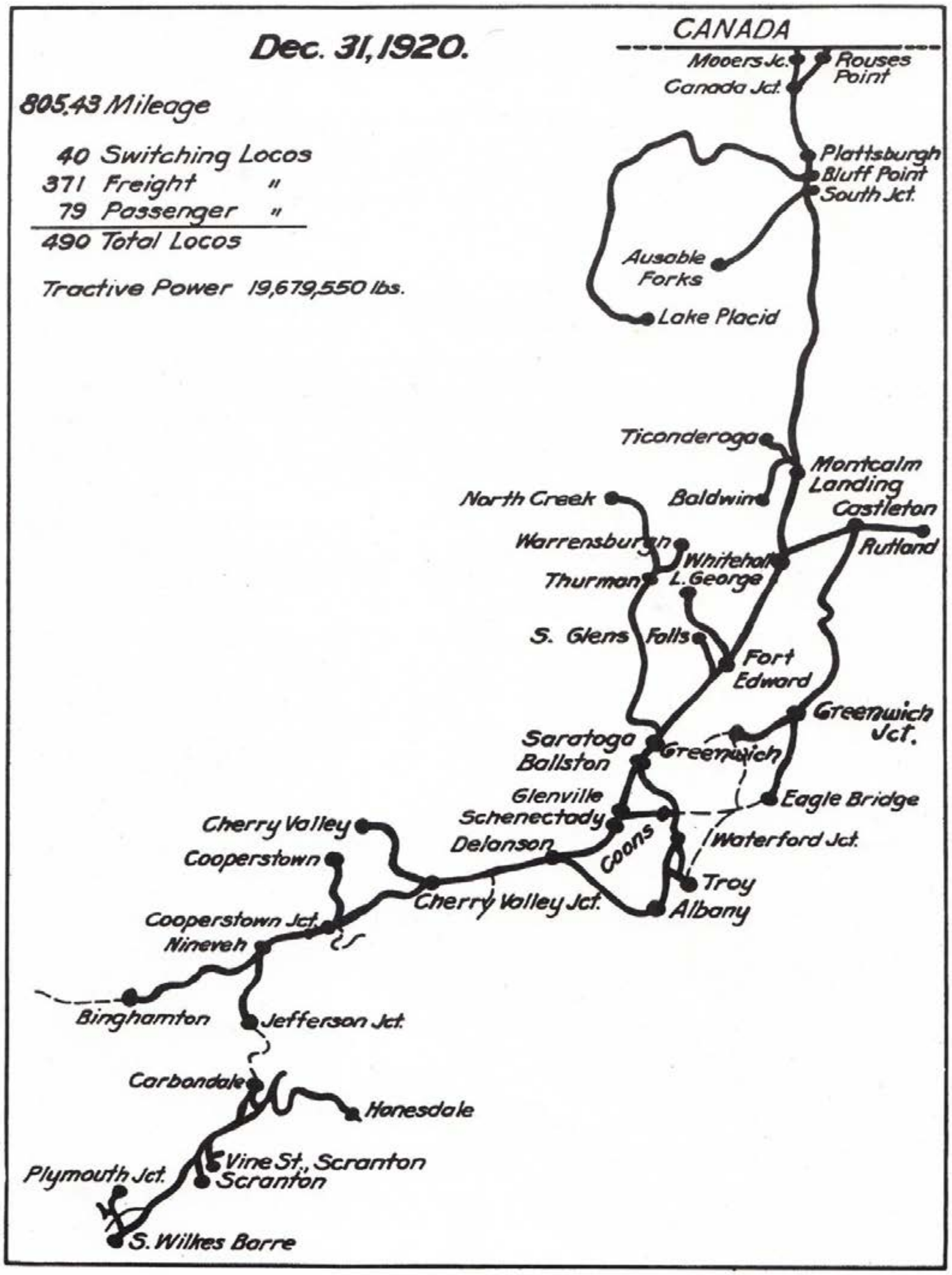
A notable improvement, from standpoint of locomotive efficiency, in this period, was the introduction of the superheater, which had previously received considerable development, in European practice. Probably the first attempt in America was made in 1878 on the Chicago, Burlington & Quincy Railroad. In this design the heat for superheating was obtained from the gases in the forward portion of the boiler tubes, and being at a relatively low temperature, produced very little superheat. The construction was expensive, very difficult to maintain, and was soon abandoned.

In 1903 the American Locomotive Company built a ten wheel cross-compound locomotive for the Canadian Pacific Railroad, which had probably the first fire tube superheater built in this country. It was of the single loop arrangement, which had for several years prior to that time been used in Germany and other European Countries, and was originated with Doctor Schmidt and was a prototype of the fire tube superheater used today.

Some few years prior to 1903 the Canadian Pacific had purchased in England some locomotives equipped with an earlier Schmidt design of the smoke box type. These designs had proven conclusively to the Canadian Pacific Railroad that highly superheated steam could be used successfully in locomotive cylinders with marked improvement in locomotive economy. The design, however, was very bulky, expensive to fabricate and required considerable maintenance in keeping the superheating surfaces clean, resulting in much dead time of the power in the roundhouses. The development, however, was watched with much interest on the part of the American Railroad officials, and quite a number of locomotives embodying this principle were constructed. From 1903 to 1909 a variety of constructions were developed, among which were the "Vaughn-Horsey," which was used to a very considerable extent on the Canadian Pacific Railroad; the "Emerson," used on the Great Northern and Burlington; the "Jacob-Schupert" and the "Buck-Jacobs," used on the the Atchison, Topeka and Santa Fe Railroad; the "Cole," of the American Locomotive Company; and the "Vauclain," of the smoke box type, by the Baldwin Locomotive Works.

The first "Schmidt" superheater, which is the base of the prevailing type of today, was applied to a Northern Pacific Locomotive, type 4-6-2, in August 1906.

There are today in excess of 50,000 locomotives in service in the United States and Canada equipped with firetube superheaters of design along the lines of this common standard.


Dec. 31, 1920.
805.43 Mileage
40 Switching Locos
371 Freight "
79 Passenger "
490 Total Locos
Tractive Power 19,679,550 lbs.
CANADA
Mooers Jc.
Rouses Point
Canada Jct.
Plattsburgh
Bluff Point
South Jct.
Ausable Forks
Lake Placid
Ticonderoga
Montcalm Landing
Baldwin
North Creek
Castleton
Rutland
Warrensburgh
Whitehall
Thurman
L. George
S. Glens Falls
Fort Edward
Greenwich Jct.
Saratoga
Greenwich
Ballston
Glenville
Schenectady
Eagle Bridge
Cherry Valley
Delanson
Coons
Waterford Jct.
Cooperstown
Troy
Cherry Valley Jct.
Albany
Cooperstown Jct.
Nineveh
Binghamton
Jefferson Jct.
Carbondale
Honesdale
Vine St., Scranton
Scranton
Plymouth Jct.
S. Wilkes Barre

Period 1910 to 1920

Locomotives—490 *Mileage—805.43*

Development conditions obtaining December 31, 1920 were:

Period 1910 to 1920—Previous Development

Development Period—1910 to 1920

RAILROAD	DATE OPENED	FROM	TO	OPERATED BY	MILEAGE TO DEC. 31ST.	
					795.23	795.23
WilkesBarre Connecting RR.	1915	Hudson	Buttonwood	D&H. Co. & Pennsylvania RR. (Jointly)	6.65	
D. & H. Company	Mar. 8, 1911	Greenwich Jct.	Greenwich	D. & H. Co.	10.20 –	10.20
						805.43

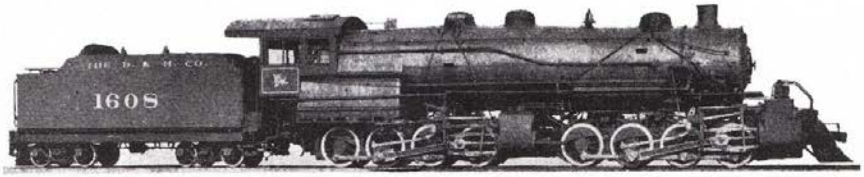
During this period the Motive Power increased from four hundred forty-seven to four hundred ninety locomotives. The gradual development as to size is clearly brought out in the detailed data presented of the power purchased from the American Locomotive Company as follows:

Locomotives Furnished by American Locomotive Company—Period 1910 to 1920

Railroad	No. of Locos.	Type	Cylinders	Diam. Drvrs.	Fuel	Total Weight	Date Built	Firebox Length	Firebox Width	Boiler Diam.	Tubes Diam.
D&H. Company.......	4	0-8-8-0	26"x41"x28"	51"	Culm	461000	1911	10'6$\frac{1}{8}$"	9'6"	88"	2$\frac{1}{4}$"
D&H. Company.......	5	4-6-0	21"x26"	63"	Oil	193000	1911	8'	6'3$\frac{1}{4}$"	64$\frac{15}{16}$"	2"
D&H. Company.......	1	4-6-0	23"x26"	63"	Oil	193000	1911	8'	6'3$\frac{1}{4}$"	64$\frac{15}{16}$"	2"
D&H. Company.......	1	2-8-0	23"x30"	57"	Oil	211000	1911	8'6"	6'3$\frac{1}{4}$"	73"	2"
D&H. Company.......	3	0-8-8-0	26"x40"x28"	51"	Culm	463000	1912	10'6$\frac{1}{8}$"	9'6"	88"	2$\frac{1}{4}$"
D&H. Company.......	12	2-8-0	25"x30"	57"	Culm	254000	1912	10'6$\frac{1}{8}$"	9'6"	82"	2"
D&H. Company.......	15	2-8-0	25"x30"	57"	Culm	256000	1913	10'6$\frac{1}{8}$"	9'6"	82"	2"
D&H. Company.......	10	4-6-2	24"x28"	69"	Culm	295050	1914	11'$\frac{1}{8}$"	9'$\frac{1}{4}$"	76$\frac{9}{16}$"	2"
D&H. Company.......	15	2-8-0	25"x30"	57"	Culm	256000	1914	10'6$\frac{1}{8}$"	9'6"	82"	2"
D&H. Company.......	1	2-8-0	27"x32"	63"	Culm	293600	1916	10'6$\frac{1}{8}$"	9'6"	86"	2"
D&H. Company.......	20	2-8-0	27"x32"	63"	Culm	296000	1918	11'	9'6"	84$\frac{1}{4}$"	2"

In 1911 four and in 1912 three "Mallets," type 0-8-8-0, were purchased, very similar in design to those in service, with the exception that superheaters were incorporated. Cut illustration of locomotive number 1608 of this class is given. These locomotives had twenty-six and forty-one by twenty-eight inch cylinders; fifty-one inch drivers; straight top boiler, eighty-eight inches in diameter, carrying two hundred twenty pounds of steam; firebox, ten feet six and one-eighth inches long by nine feet six inches wide; wheel base, rigid fourteen feet nine inches; total engine forty feet two inches, engine and tender seventy-five feet seven and one-quarter inches; weights, on drivers 463,000 pounds, total engine 463,000 pounds, engine and tender 596,500 pounds; heating surface 5597.4 square feet; tractive power, simple 142,000 pounds, compound 107,700 pounds. Tender capacity, 9,000 gallons of water and fourteen tons of coal.

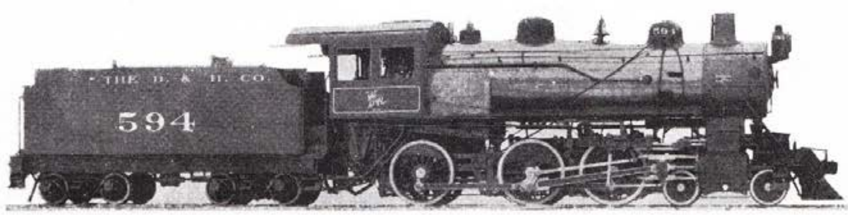
LOCOMOTIVE 1608



Built by American Locomotive Company in 1911, Class "H". Gauge of Track 4′8½″. Cylinders, Diameter, High Pressure 26″, Low Pressure 41″, Stroke 28″. Driving Wheel Diameter 51″. Boiler, Diameter 88″, Pressure 220 Pounds. Fire Box, Length 126½″, Width 114″. Tubes, Superheater 42, Diameter 5½″, Length 24′0″, Regular 270, Diameter 2¼″, Length 24′0″. Wheel Base, Driving 14′9″ and 14′9″, Engine 40′2″, Engine and Tender 75′7¼″. Weight in Working Order, Driving 463000 Pounds, Engine 463000 Pounds, Engine and Tender 596500 Pounds. Fuel, Soft Coal. Heating Surface, Tubes 5245, Fire Box 352.4, Total 5597.4 Square Feet. Superheater 1106. Tractive Power 142000 Simple, 107700 Compound. Tender Capacity, Water 9000 Gallons, Fuel 14 Tons.

In 1911 seven locomotives, adaptable for oil or bituminous coal burning, were purchased for service on the Chateaugay Branch, the "Wooten" type box, experience having shown to be a failure with the use of oil. Photographic cut is given of the number 594 as illustrative of five of these locomotives purchased. These locomotives had twenty-one by twenty-six inch cylinders; sixty-three inch drivers; wagon top boiler, sixty-four and fifteen-sixteenths inches in diameter, carrying two hundred pounds steam pressure; firebox, eight feet long by six feet three and one-quarter inches wide; wheel base, rigid fifteen feet, engine twenty-six feet seven inches, engine and tender fifty-seven feet ten and one-half inches; weights, on engine truck 47,000 pounds, on drivers 146,000 pounds, total engine 193,000 pounds, engine and tender 338,600 pounds. Heating surface 2789 square feet; tractive power 31,440 pounds; tender capacity, 6,800 gallons of water and 2,900 gallons of oil.

LOCOMOTIVE 594

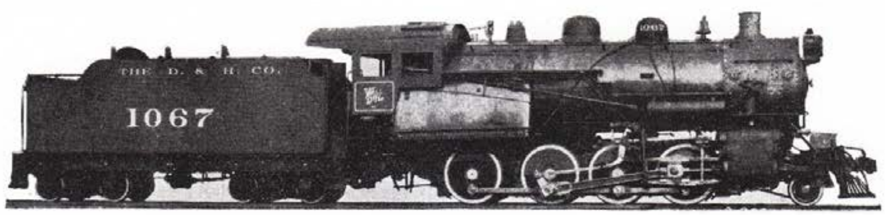


Built by American Locomotive Company in 1911, Class D-3-B. Gauge of Track 4′8½″. Cylinders, Diameter 21″, Stroke 26″. Driving Wheel Diameter 63″. Boiler, Diameter 64 15/16″, Pressure 200 Pounds. Fire Box, Length 96″, Width 75¼″. Tubes 350, Diameter 2″, Length 14′6″. Wheel Base, Driving 15′0″, Engine 26′7″, Engine and Tender 57′10½″. Weight in Working Order, Leading 47000 Pounds, Driving 146000 Pounds, Engine 193000 Pounds, Engine and Tender 338600 Pounds. Fuel, Oil. Heating Surface, Total 2789 Square Feet. Tractive Power 31440 Pounds. Tender Capacity, Water 6800 Gallons, Fuel 2900 Gallons.

In 1912, twelve "Consolidations", type 2-8-0, were purchased. These locomotives were of a very similar design to the previous back cab freight power with the

exception tractive power was increased from 51,000 to 57,000 pounds. Photographic cut is given of the 1067 as illustrative of this purchase. These locomotives had twenty-five by thirty inch cylinders; fifty-seven inch drivers; straight top boiler, eighty-two inches in diameter, with a a steam pressure of two hundred pounds; firebox, ten feet six and one-eighth inches long by nine feet six inches wide; wheel base, rigid seventeen feet, engine twenty-six feet one inch, engine and tender sixty-three feet four and one-half inches; weights, on engine truck 26,600 pounds, on drivers 230,500 pounds, total engine 256,000 pounds, engine and tender 429,700 pounds. Heating surface 3095 square feet; tractive power 56,900 pounds; tender capacity, 9,000 gallons of water and 14 tons of coal.

[LOCOMOTIVE 1067]



Built by American Locomotive Company in 1913, Class E–5. Gauge of Track 4′8½″. Cylinders, Diameter 25″, Stroke 30″. Driving Wheel Diameter 57″. Boiler, Diameter 82″, Pressure 200 Pounds. Fire Box, Length 126⅛″, Width 114″. Tubes, Superheater 38, Diameter 5″, Length 14′6″, Regular 275, Diameter 2″, Length 14′6″. Wheel Base, Driving 17′0″, Engine 26′1″, Engine and Tender 63′4½″. Weight in Working Order, Leading 25500 Pounds, Driving 230500 Pounds, Engine 256000 Pounds, Engine and Tender 429700 Pounds. Fuel, Fine Anthracite. Heating Surface, Tubes and Flues 2843, Fire Box 252, Total 3095. Square Feet. Superheater 622.5. Tractive Power 56900 Pounds. Tender Capacity, Water 9000 Gallons, Fuel 14 Tons.

In 1914 the continued increase in weight of equipment, particularly on the night trains to and from Montreal, necessitated the introduction of a heavier type of passenger locomotive. The conditions obtaining as to Pullman equipment operating on line were as follows:

1895 — 108,116 pounds	1915 — 147,400 pounds
1905 — 122,380 pounds	1925 — 157,369 pounds

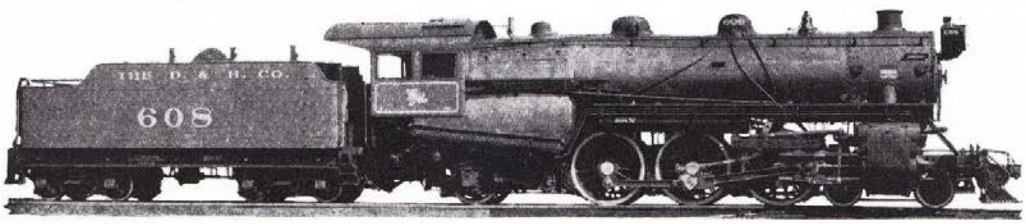
and on passenger equipment:

1895 — 55,500 pounds
1905 — 81,300 pounds
1915 — 108,000 pounds

Accordingly, ten locomotives were purchased in this year of the "Pacific" design, 4-6-2 type. Photographic cut is given of the 608 as illustrative of this class. These locomotives had twenty-four by twenty-eight inch cylinders; sixty-nine inch drivers (three of these locomotives have since had driver diameter increased to seventy-three inches); straight top boiler, seventy-nine and nine-sixteenths inches diameter, with a steam pressure of two hundred five pounds; firebox, eleven feet one-eight inch long by nine feet one-quarter inch wide; wheel base, rigid, thirteen feet, engine thirty-four feet ten inches, engine and tender seventy feet five and three-quarter inches; weights, on engine truck 47,500 pounds,

on drivers 191,000 pounds, on trailer 55,000 pounds, engine total 293,500 pounds, engine and tender 460,000 pounds. Heating surface 3,896 square feet; tractive power 41,350 pounds; tender capacity, 8,000 gallons of water and fourteen tons of coal.

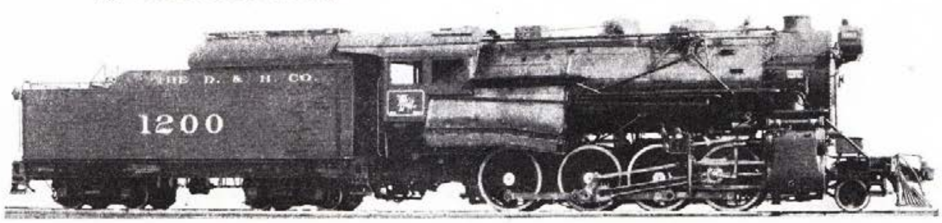
LOCOMOTIVE 608



Built by American Locomotive Company in 1914, Type 4–6–2. Gauge of Track 4′8½″. Cylinders, Diameter 24″, Stroke 28″. Driving Wheel Diameter 69″. Trailer Wheel Diameter 45″. Boiler Wagon Top, Inside Diameter 76$\frac{9}{16}$″, Pressure 205 Pounds. Fire Box, Length 11′⅛″, Width 9′¼″. Tubes, Superheater 34, Diameter 5⅜″. Length 20′0″, Ordinary 252, Diameter 2″, Length 20′0″. Wheel Base, Rigid 13′, Engine 34′10″, Engine and Tender 70′5¾″. Weight, on Engine Truck 47500 Pounds, Drivers 191000 Pounds, Trailer 55000 Pounds, Total Engine 293500 Pounds, Engine and Tender 460000 Pounds. Fuel, Anthracite. Heating Surface, Tubes 3519, Fire Box 277, Total 3896 Square Feet. Tractive Power 41350 Pounds. Tender Capacity, Water 8000 Gallons, Fuel 14 Tons.

In 1916 an experimental heavier "Consolidation," type 2-8-0, locomotive was purchased, road number 1200. A cut illustration is given of this locomotive which had twenty-seven by thirty-two inch cylinders; sixty-three inch diameter drivers; wagon top boiler, eighty-six inches in diameter, with a steam pressure of one hundred ninety-five pounds; firebox, ten feet six and one-eighth inches long by nine feet six inches wide; wheel base, rigid, seventeen feet six inches; engine, twenty-six feet seven inches, engine and tender sixty-five feet five inches; weights, on engine truck 25,800 pounds, on drivers 267,800 pounds, total engine 293,600 pounds, engine and tender 452,133 pounds. Heating surface 3,814 square feet; tractive power 67,150 pounds; tender capacity, 9,000 gallons of water and 14½ tons of coal.

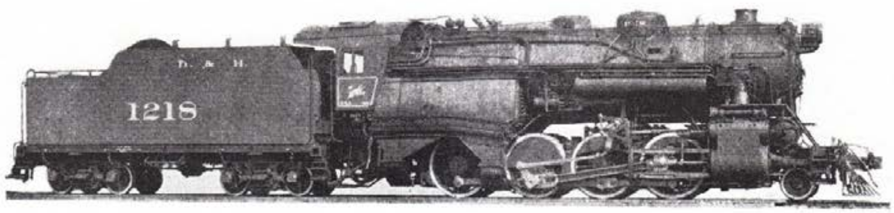
LOCOMOTIVE 1200



Built by American Locomotive Company in 1916, Class E–5. Gauge of Track 4′8½″. Cylinders, Diameter 27″, Stroke 32″. Driving Wheel Diameter 63″. Boiler, Diameter 86″, Pressure 195 Pounds. Fire Box, Length 126⅛″, Width 114″. Tubes, Superheater 46, Diameter 5⅜″, Length 15′0″, Regular 326, Diameter 2″, Length 15′0″. Wheel Base, Driving 17′6″, Engine 26′7″, Engine and Tender 65″5′. Weight in Working Order, Leading 25800 Pounds, Driving 267800 Pounds, Engine 293600 Pounds, Engine and Tender 452133 Pounds. Fuel, Anthracite. Heating Surface, Tubes 2544, Flues 965, Fire Box 251, Arch Tubes 54, Total 3814 Square Feet, Superheater 793. Tractive Power 67150 Pounds. Tender Capacity, Water 9000 Gallons, Fuel 14½ Tons.

In 1918 twenty more of a very similar design to locomotive number 1200 were purchased, having practically equivalent characteristics. Photographic cut is given of the 1218 as illustrative.

LOCOMOTIVE 1218



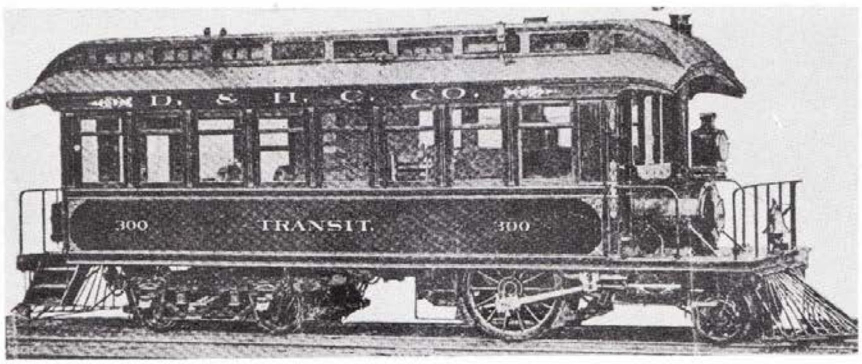
Built by American Locomotive Company in 1918, Class E-6-A. Gauge of Track 4'8½". Cylinders, Diameter 27", Stroke 32". Driving Wheel Diameter 63". Boiler, Diameter 84¼", Pressure 210 Pounds. Fire Box, Length 132", Width 114". Tubes, Superheater 46, Diameter 5⅜", Length 13'4", Regular 316, Diameter 2", Length 13'4". Wheel Base, Driving 17'6", Engine 26'11", Engine and Tender 64'6¾". Weight in Working Order, Leading 30500 Pounds, Driving 265500 Pounds, Engine 296000 Pounds, Engine and Tender 442500 Pounds. Fuel, Anthracite. Heating Surface, Tubes 2190, Flues 857, Fire Box 297, Arch Tubes 86, Total, 3410 Square Feet. Superheater 683. Tractive Power 67150 Pounds. Tender Capacity, Water 9000 Gallons, Fuel 15 Tons.

The marked change, aside from the increased weight of freight power purchased and the introduction of a heavier type of passenger locomotive, was the introduction of the superheater which was applied in all locomotives purchased after 1911 with the exception of the five oil burners on the Chateaugay Branch. It also marks their installation in the Company's Shops, with the result that at this writing two hundred fifty-one of the locomotives are so equipped. Experimental tests have indicated with the switching conditions obtaining on the property, due to the limited movement, results had with superheating of switching power are such, installation is not felt essential to fully efficient service.

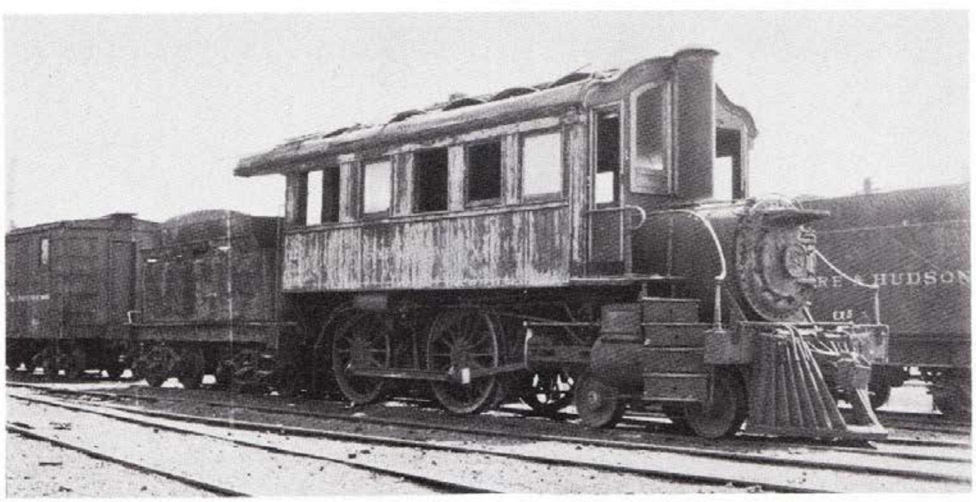
The outstanding development in America in this period, with reference to locomotives, was a by-product of the World War. The government assumed control of all the trunk line railways in the United States, December 28, 1917, and their operation was intrusted to the United States Railroad Administration, which body at once assumed the right to centralize the purchases of all railroad equipment, including locomotives. The Director General of the Railroad Administration appointed a committee to standardize specifications for locomotives, and in accordance with his instructions, said committee, and the committee of railroad officials collaborated with the locomotive builders in preparing twelve specifications of designs of locomotives comprising twelve sizes of locomotives divided among eight types. The locomotive builders sharing in this work were the Baldwin Locomotive Works, the American Locomotive Company and the Lima Locomotive Works, Incorporated. The first conference was held at the office of the Baldwin Locomotive Works, March 13, 14 and 15, 1918 and subsequent meetings were held in the Interstate Commerce Building, Washington, with the result that an order for standard locomotives was placed and divided among these builders April 30, 1918.

The standard locomotives were distributed to the various railroads of the country as directed by the Railroad Administration. As they were not adaptable to the class of fuel burned by The Delaware and Hudson Company, none were received by this Company. It is of more than passing interest to note that although these locomotives have in a measure been used as the bases of specifications for other locomotives built since the railroads were returned to their owners, the details and equipment of subsequent locomotives have been revised to suit the standards of the individual roads for which they were built.

During this period the first "Mountain," 4-8-2, type, locomotive was built, in 1912, by the American Locomotive Company for the Chesapeake and Ohio Railroad for heavy passenger service. Over lines encountering steep gradients; also in fast freight service, this type of power has enjoyed considerable popularity.



TRANSIT

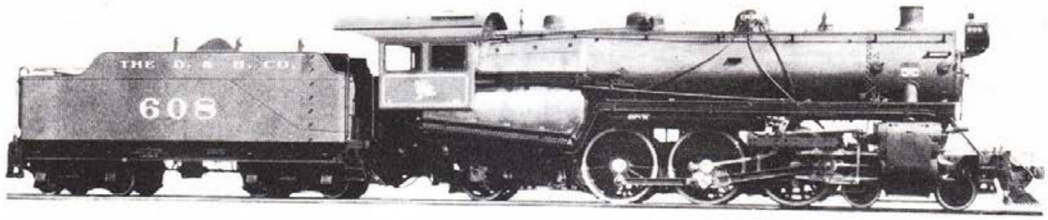


SARATOGA

The two inspection engines.

CLASS P REBUILDS

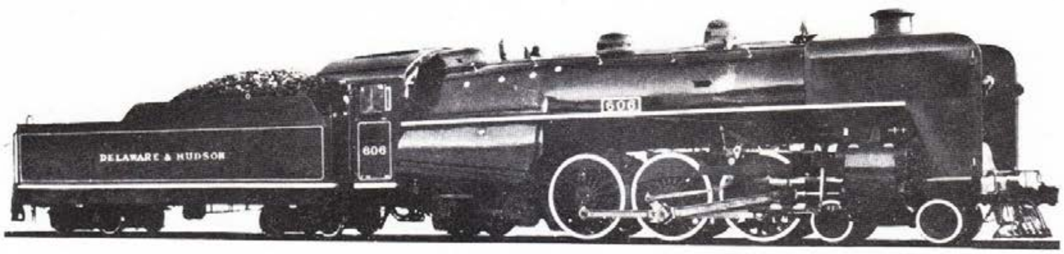
BEFORE



LOCOMOTIVE 608

Built by American Locomotive Company in 1914. Type 4-6-2. Gauge of Track 4'8½". Cylinders, Diameter 24", Stroke 28". Driving Wheel Diameter 69". Boiler, Straight Top, Inside Diameter 76 9/16", Pressure 205 Pounds. Fire Box, Length 132⅛", Width 108¼". Tubes, Superheater 34, Diameter 5⅜", Length 20'0", Ordinary 252, Diameter 2", Length 20'0". Wheel Base, Driving 13'0", Engine 34'10", Engine and Tender 70'5¾". Weight on Engine Truck 47500 Pounds, Drivers 191000 Pounds, Trailer 55000 Pounds, Total Engine 293500 Pounds, Engine and Tender 428500 Pounds. Fuel, Anthracite. Heating Surface: Tubes 3579, Fire Box 277, Arch Tubes 40, Total 3896 Square Feet, Superheater 796 Square Feet. Tractive Power 41350 Pounds. Tender Capacity, Water 8000 Gallons, Fuel 14 Tons.

AFTER

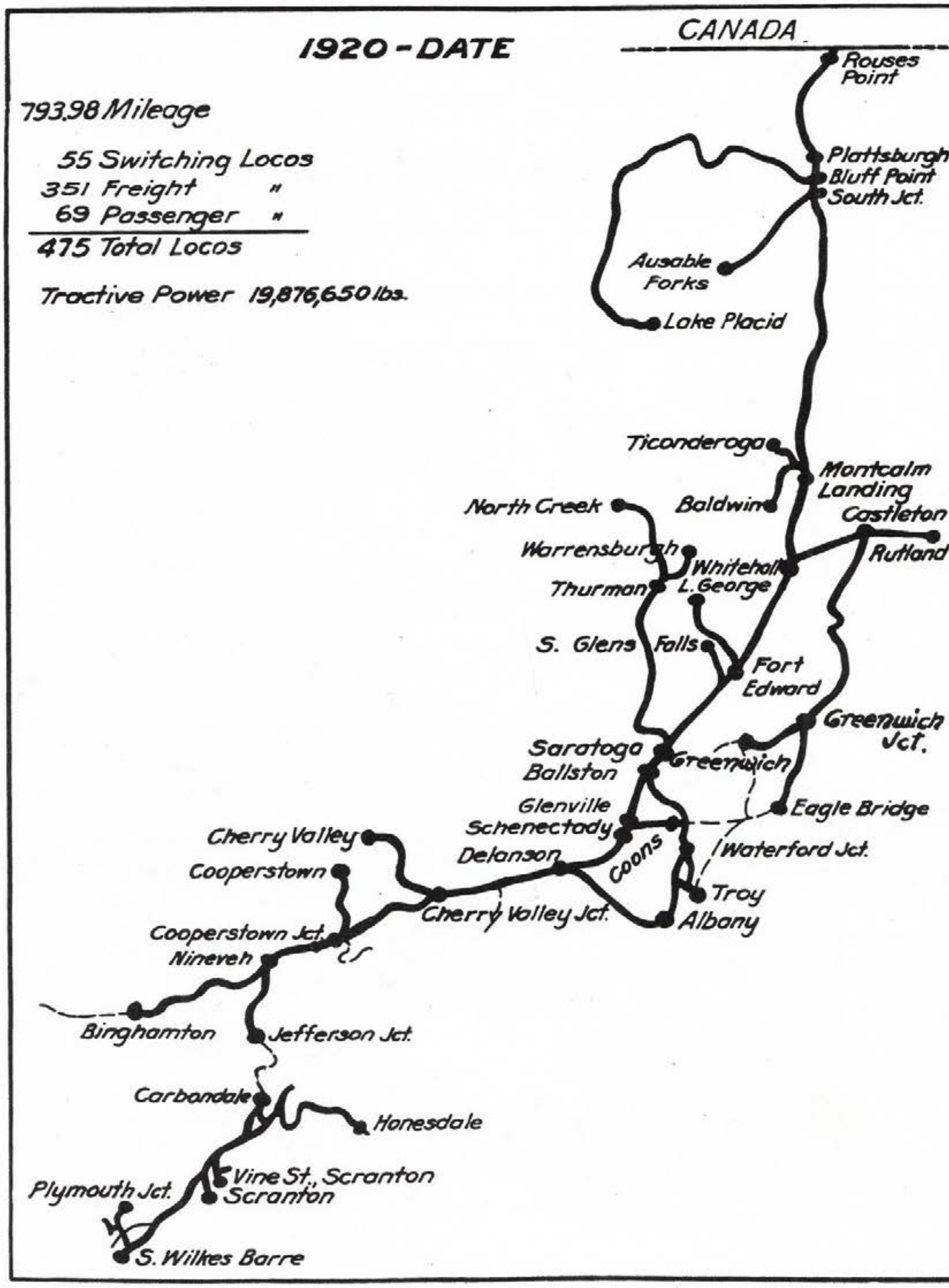


LOCOMOTIVE 606

Rebuilt by The Delaware and Hudson Railroad Corporation in 1934-To-1936. Type 4-6-2. Gauge of Track 4'8½". Cylinders, Diameter 24", Stroke 28". Driving Wheel Diameter 73". Boiler, Straight Top, Inside Diameter 76-9/16", Pressure 225 Pounds. Fire Box, Length 132⅛", Width 108¼". Tubes, Superheater 34, Diameter 5⅜", Length 20'0", Ordinary 252, Diameter 2", Length 20'0". Wheel Base, Driving 13'0", Engine 34'10", Engine and Tender 76'8". Weight, on Engine Truck 47500 Pounds, Drivers 192500 Pounds, Trailer 55000 Pounds, Total Engine 295000 Pounds, Engine and Tender 455500 Pounds. Fuel, Anthracite and Bituminous. Heating Surface: Tubes 3579, Fire Box 277, Arch Tubes 40, Total 3896 Square Feet, Superheater 840 Square Feet. Tractive Power 42750 Pounds. Tender Capacity, Water 11000 Gallons, Fuel 14 Tons. Equipped with Roller Bearings on Main Axle Boxes. Two Locomotives have Roller Bearings on Side and Main Rod Bearings of Main Crank Pin.

Rebuilds of this class during the Decade were as follows:

Year	1934	3 Locomotives
	1935	1 Locomotive
	1936	1 Locomotive
Total		5 Locomotives


1920 - DATE
CANADA
793.98 Mileage
55 Switching Locos
351 Freight "
69 Passenger "
475 Total Locos
Tractive Power 19,876,650 lbs.
Rouses Point
Plattsburgh
Bluff Point
South Jct.
Ausable Forks
Lake Placid
Ticonderoga
Montcalm Landing
Baldwin
North Creek
Castleton
Rutland
Warrensburgh
Whitehall
Thurman
L. George
S. Glens Falls
Fort Edward
Greenwich Jct.
Saratoga
Ballston
Greenwich
Glenville
Schenectady
Eagle Bridge
Cherry Valley
Delanson
Coons
Waterford Jct.
Cooperstown
Troy
Cherry Valley Jct.
Albany
Cooperstown Jct.
Nineveh
Binghamton
Jefferson Jct.
Carbondale
Honesdale
Vine St., Scranton
Plymouth Jct.
Scranton
S. Wilkes Barre

Period 1920 to Date

Locomotives—475 *Mileage—793.98*

The history of this decade is in the making.

A number of very interesting developments are taking place, three of which might be mentioned as distinctive. They are:

First — The development and introduction of the use of an auxiliary locomotive on tender;

Second —The purchase of an experimental high powered (350 pound) cross-compound locomotive;

Third — The adoption of the policy covering conversion of the middle cab power into a modernized type with the cab at the rear of the locomotive.

AUXILIARY LOCOMOTIVE:

Comparatively with the electric, the steam locomotive has been handicapped,—

First — By non-revenue tender load to absorb portion of its power;

Second — By an irregular torque development, resulting in undue stresses on equipment at starting.

With cognizance of the foregoing, the auxiliary locomotive was conceived and developed, with these three thoughts in major, as a basic premise,—

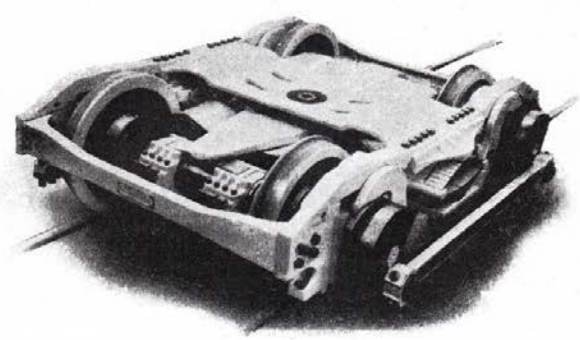
First — To develop into revenue tractive power, at moderate speeds, the excess boiler capacity, the volume of which is increased materially by the use of superheated steam;

Second — To convert the useless tender weight (as a motive agent) into a source of additional tractive power, varying between 10,000 and 20,000 pounds, dependent on the speed;

Third — To obtain a more nearly constant torque.

A photographic illustration is given of this auxiliary locomotive.

AUXILIARY LOCOMOTIVE



The results had from service, which includes the terminal handling, clearly demonstrates the following advantages:

First —	Increased tonnage the locomotive can haul;
Second —	Decrease of abnormal stresses on draft gears and equipment;
Third —	More prompt and constant acceleration;
Fourth —	Reduction in tire and rail wear as affected by locomotive slippage;
Fifth —	Increased average speed over grades;
Sixth —	Limited grades may be equalized without very heavy capital expenditure;
Seventh —	Increased tonnage is possible over bridges where limits are now had as to weights of locomotives;
Eighth —	Auxiliary locomotive location is such no increased delay is occasioned by repairs in turning of power;
Ninth —	It permits the use of lower factor of adhesion in locomotive design due to a more equalized torque;
Tenth —	Effects fuel economy by reducing time for movement over Division.

In August, 1925, a very close check was kept of the operation of locomotive number 901 on the Champlain Division, and the increased gross income from the use of the Auxiliary Locomotive on this engine said month was $5,234.58.

Twenty-one of these Auxiliary Locomotives have been purchased.

EXPERIMENTAL HIGH POWERED LOCOMOTIVE

"Horatio Allen", Road Number 1400

The prevailing type of steam power of today retains the fundamental features of the locomotive of seventy-five years ago, namely: the water leg firebox, multitubular type of boiler, single expansion cylinders, exhaust steam for force draft, and the general arrangement of frames and cylinders. The major changes have been to increase the size, raise boiler pressures within limited capacity, and to add special appliances and accessories, to promote capacity, efficiency and economy.

The continual demand of public opinion for improved transportation service and lower rates has, in the past few years, given rise to intensive study of the possibilities of improvement in the locomotive and also of its operation.

The "Horatio Allen" was designed to determine what can be accomplished in the better production and utilization of fuel heat, by means of higher steam pressure and the greater use of its expansive properties in combination with the development of maximum hauling power in the most simplified form of the modern steam locomotive, consisting of two cylinders and four pairs of driving wheels.

Studying first principles, to convert a certain amount of water into two hundred pounds pressure, 1,199.2 pounds of coal must be used. To increase the two hundred pounds pressure to three hundred fifty pounds, only 74 pounds more coal must be used and this increase of less than 6.2% in fuel, gives an increase of one hundred fifty pounds pressure, or 75% in power. This fundamental has been incorporated in this locomotive.

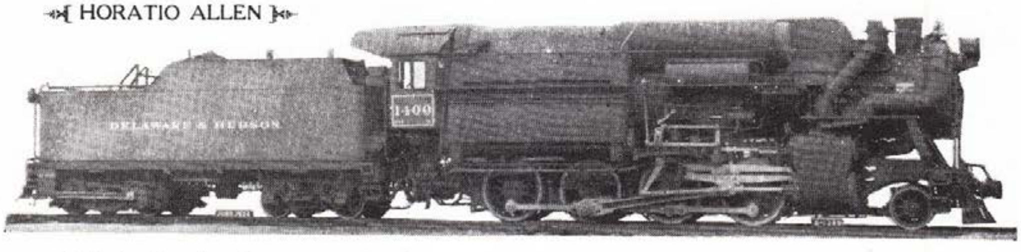
It is axiomatic, in principle, the greater the use of expansive properties of dry steam, the greater the economy. To this end, in this locomotive the steam is first used in the right and again in the left cylinder by which double expansion process the heat is more effectually utilized before being exhausted to the atmosphere.

Exhaustive experiments, repeatedly observed, have clearly shown the value of a square foot of heating surface in the firebox, as compared with that in the flues, is roughly in the ratio of five to one. In the design of the "Horatio Allen" recognition is had of this fact and seventy-five percent. of the steam is generated in the firebox, compared with forty percent. as obtains in the normal locomotive.

The generally accepted maximum pressure possible with the normal type of locomotive boiler is two hundred fifty pounds. It therefore became necessary, in order to accomplish these ends, to design a substantially different type, the particular idea being to eliminate the usual stayed type flat sheet firebox side and crown sheets and water legs, in combination with their sluggish circulation, and substitute self-supporting cylindrical containers, in line with stationary and marine practice.

Photographic illustration is given of this locomotive, the service of which is being watched with intense interest in America and foreign countries. This locomotive has twenty-three and one-half and forty-one by thirty inch cylinders; fifty-seven inch drivers; water tube type boiler, sixty-one and seven-eighths inches in diameter, carrying three hundred fifty pounds steam pressure; firebox, eleven feet five inches long by six feet three inches wide; forty-two superheater tubes, five and three-eighths inches in diameter, fifteen feet long and one hundred forty-five ordinary flues, two inches in diameter, fifteen feet long. Wheel base, rigid eighteen feet, total engine twenty-nine feet, engine and tender sixty-five feet seven and three-quarter inches; weights, on engine truck 49,500 pounds, on drivers 298,500 pounds, total engine 348,000 pounds, total engine and tender 510,000 pounds; bituminous and anthracite fuel; heating surface, tubes 2013 square feet, firebox 1187 square feet, total 3200 square feet. Tractive power, compound 71,600 pounds and simple 85,800 pounds; tender capacity 9,000 gallons of water and 14 tons of coal.

HORATIO ALLEN



Built by American Locomotive Company in 1924, Type 2–8–0. Gauge of Track 4′8½″. Cylinders, Diameter High Pressure 23½″, Low Pressure 41″, Stroke 30″. Driving Wheel Diameter 57″. Boiler, Water Tube Type, Diameter 61⅞″, Pressure 350 Pounds. Fire Box, Length 137″, Width 75″. Tubes, Superheater 42, Diameter 5⅜″, Length 15′0″, Regular 145, Diameter 2″, Length 15′0″. Wheel Base, Driving 18′0″, Engine 29′0″, Engine and Tender 65′7¾″. Weight in Working Order, Leading 49500 Pounds, Driving 298500 Pounds, Engine 348000 Pounds, Engine and Tender 510000 Pounds. Fuel, Bituminous and Anthracite Coal Mixed. Heating Surface, Tubes 1132, Flues 881, Firebox 1124. Arch Tubes 63, Total 3200 Square Feet. Superheater 579. Tractive Power, Simple at 350 Pounds Boiler Pressure 85800 Pounds, Compound at 350 Pounds Boiler Pressure 71600 Pounds. Tender Booster at 250 Pounds Boiler Pressure 19700 Pounds. Tender Capacity, Water 9000 Gallons, Fuel 14 Tons.

The following data giving comparisons between this locomotive in road service and that of engines on the Pennsylvania Railroad's test plant at Altoona, is of particular interest, clearly indicating the results of the experiment, and are most encouraging.

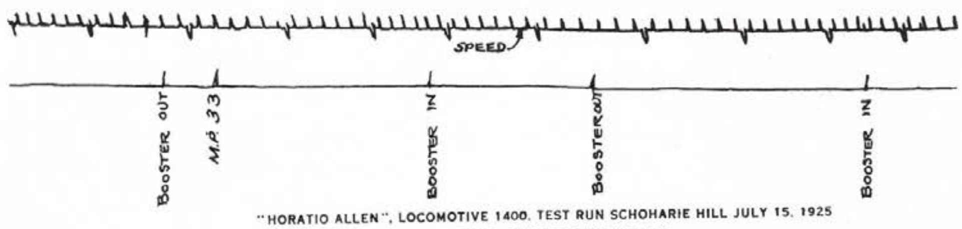
Performance Comparison

ITEM	"Horatio Allen" D&H 1400; Consolidation Compound, one road trip	"Horatio Allen" D&H 1400; Consolidation Compound, Avg. of 5 road trips	Penn I 1-S DECAPOD TEST PLANT Stoker fired, with feed water heater	Penn I 1-S DECAPOD TEST PLANT Hand fired, with feed water heater	Penn I 1-S DECAPOD TEST PLANT Stoker fired, feed water htr. not used	Penn H-8 SB Consolidation TEST PLANT, Hand fired
Speed, miles per hr. or equivalent	16.5	15.43	14.24	14.24	14.24	14.38
Throttle position	Full	Full	Full	Full	Full	Full
Duration of run or test—Minutes	105	105	120	120	120	60
Cut-off—Percent	64	63.6	30	30	30	63.4
Average Boiler Pressure—Lbs.	343	345	247	245	246	204.7
Average Branch Pipe Pressure, Lbs.	325	324	247	243	245	195.9
Average Branch Pipe Superheat—Degrees.	105	105	172	158	192	210.25
Lbs. coal fired—Total	6316	6869.8	8216	6743	9081	5144
Lbs. coal fired per sq. ft. grate surf.	52.4	57.44	59	48	65	92.95
Total water used—Lbs.	54561	55894	61854	61311	58265	33955
Equivalent evaporation	11.35	10.68	9.6	11.4	8.5	8.8
Efficiency of boiler—Percent	80.6	75.8	71	81	64	64.06
Average I. H. P.	1803	1814.2	1815	1741	1794	1649.4
Dry coal per I.H.P. including auxiliaries, Pounds	2.015	2.197	2.1	1.9	2.4	3.1
Steam to cylinders and auxiliaries per I.H.P.	17.5	17.91	16.8	17.6	16	20.4
Average Draw Bar Pull	41000	40560	39597	33423	34078	37502
Average Draw Bar H.P.	1694	1701	1505	1270	1295	1437.4
Dry coal per D. B. H. P., Lbs.	2.14	2.312	2.6	2.5	3.4	3.6
Machine Efficiency of Locomotive	93.8	93.86	83	73	72	87.15
Thermal Efficiency of Locomotive	8.72	8.02	7.5	7.3	5.6	5.3
Calorific value dry coal B.T.U. per pound	13649	13649	13137	13663	13663	13330

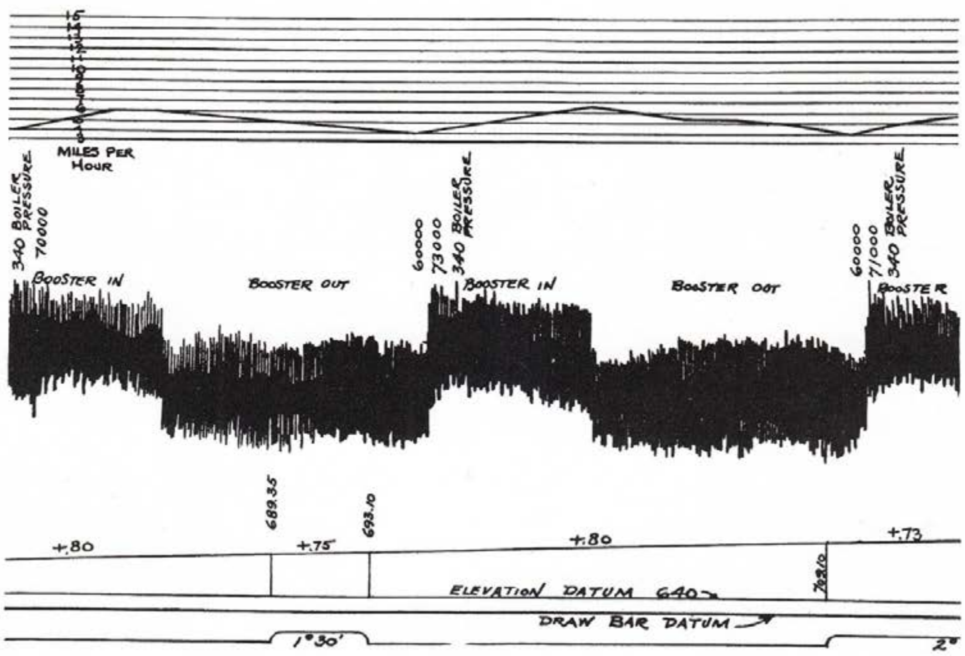
From a practical standpoint, the expense for maintenance of this boiler has been encouragingly low, no weaknesses of serious moment having as yet developed after two severe winters of service.

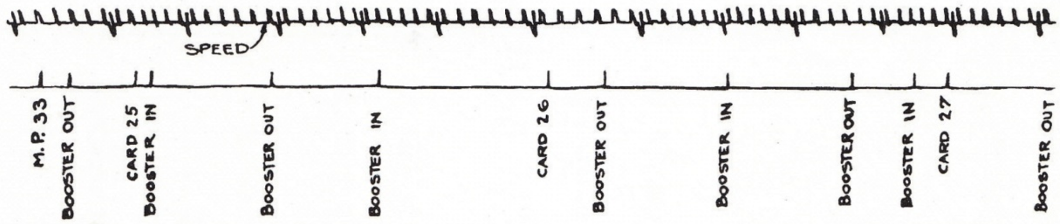
The concern as to possible results from such high pressure is dissipating, and while all care is exercised, the locomotive has become simply a locomotive with the operating forces and for the past eight or nine months has been in regular pool service.

Dynamometer charts giving certain characteristics of performance have been inserted as illustrative of results being obtained.

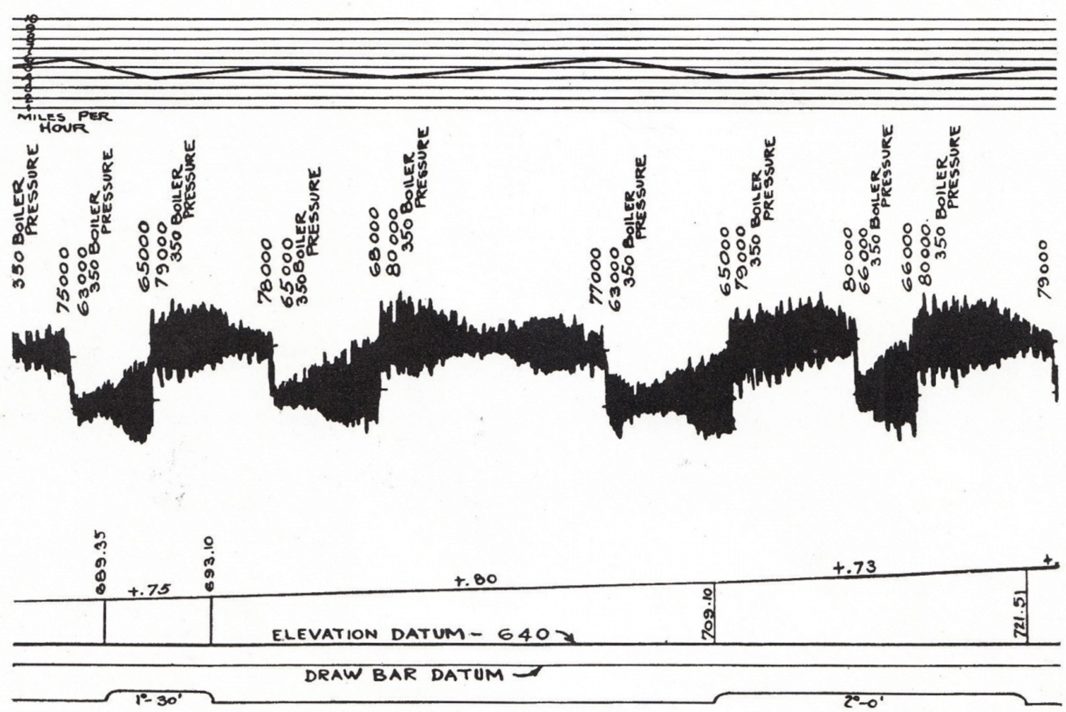


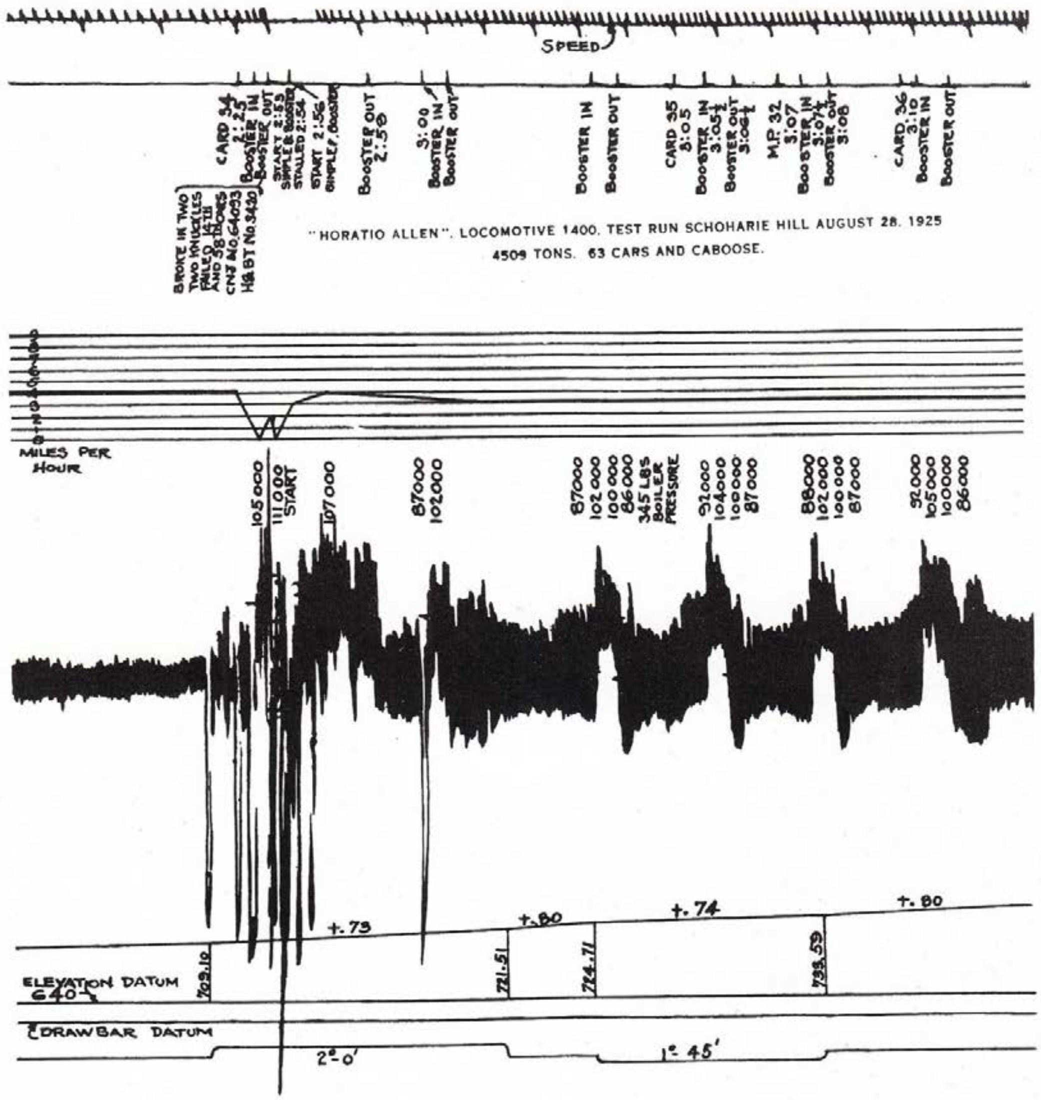
"HORATIO ALLEN", LOCOMOTIVE 1400. TEST RUN SCHOHARIE HILL JULY 15, 1925
3760 TONS. 61 CARS AND CABOOSE.





"HORATIO ALLEN", LOCOMOTIVE 1400, TEST RUN SCHOHARIE HILL AUGUST 24, 1925
4077 TONS. 57 CARS AND CABOOSE.




SPEED
BROKE IN TWO TWO KNUCKLES FAILED 14TH AND 58TH CARS CNJ No. 64093 H&BT No. 3420
CARD 34 2:25
BOOSTER IN
BOOSTER OUT
START 2:53 SIMPLE & BOOSTER STALLED 2:54
START 2:56 SIMPLE, BOOSTER
BOOSTER OUT 2:58
3:00 BOOSTER IN
BOOSTER OUT
BOOSTER IN
BOOSTER OUT
CARD 35 3:05
BOOSTER IN 3:05½
BOOSTER OUT 3:06½
M.P. 32 3:07
BOOSTER IN 3:07½
BOOSTER OUT 3:08
CARD 36 3:10
BOOSTER IN
BOOSTER OUT
"HORATIO ALLEN". LOCOMOTIVE 1400. TEST RUN SCHOHARIE HILL AUGUST 28. 1925
4509 TONS. 63 CARS AND CABOOSE.
MILES PER HOUR
105000
111000 START
107000
87000
102000
87000
102000
86000
345 LBS BOILER PRESSURE
91000
104000
100000
87000
88000
102000
100000
87000
92000
105000
100000
86000
+.73
+.80
+.74
+.80
ELEVATION DATUM 640
709.10
721.51
724.71
733.59
℄ DRAWBAR DATUM
2°-0'
1°-45'

So satisfactory has been the performance of this locomotive to date, that consideration is being given to the building of another locomotive, the "John B. Jervis," the boiler pressure of which will be 400 pounds.

It is of more than passing interest, as a possible reflex of this locomotive to note two hundred fifty pounds, which is the maximum with the normal type boiler, is now being used on the Pennsylvania, Boston & Albany, Texas & Pacific, locomotives now being built for the Canadian Pacific, and other railroads.

Excerpts from the current railway technical journals are of interest with reference to this high pressure principle. In the January 1926 issue of the Railway Mechanical Engineer, page number 14, we read:

> "It is practically a certainty that radical departures in methods of steam generation will in the future open new fields of locomotive development."

In the April 1926 issue of the same magazine, page number 212, we read:

> "In the last fifty years, steam locomotive development has followed lines that have been conservative to say the least, save in the one item of increasing size. Most of the great developments really occurred prior to 1850. Since that time the designers have been conservative, yet hardly progressive. They have been content to refine, to elaborate, to improve the original design."
>
> "Of late locomotive design seems to indicate signs of a change."
>
> "It seems likely that the trend of the times is passing from a fire tube to a water tube type of boiler."

In the English magazine, "The Railway Gazette and Railway News" of London, April 23rd, 1926 issue, page number 575, we read:

> "Reference has been made on recent occasions in these columns to a development in locomotive practice which appears to hold great possibilities, namely, special forms of boilers able to carry very high steam pressures. This is undoubtedly one of the methods which remain, and have yet to be exploited in the endeavour to keep the ordinary reciprocating type of steam locomotive in the forefront for railway traction purposes," etc. etc.

In the April 30th, 1926 issue of this magazine, page number 605, we read:

> "The recent comments on high steam pressures for locomotive boilers in our pages have a further significance owing to the continued and increasing attention that is being given to the subject abroad. Our American contemporary "Railway Mechanical Engineer" in its latest issue deals with the matter in an article headed "Future Possibilities of the Locomotive Boiler," contributed by an experienced locomotive engineer. He points out that whereas the first steam locomotive successfully developed, worked at a pressure of about 7 lb.; today pressures of 200 lb. are common with ordinary types of boilers, while much higher pressures are forecasted in general use but in conjunction with radical changes in boiler design. The whole reason for the trend towards higher pressures lies in the fact that while the total heat to be imparted to 1 lb. of water remains practically the same at all pressures, the heat of vaporization, which is never available as mechanical energy, steadily decreases as the pressure increases. This means that as the pressure rises, a steadily increasing percentage of heat is available as useful work. Theoretical

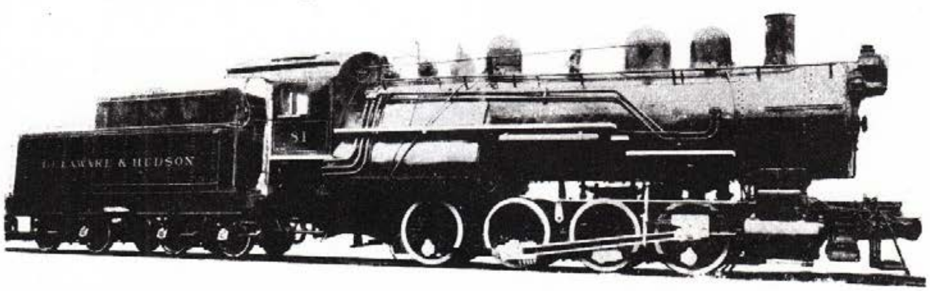
savings are, of course, larger than practical ones, because of the greater condensation occurring at the higher temperatures used, and other factors. Nevertheless, with proper superheating to minimize the condensation and with normal precautions in design, undoubtedly the possibilities in increased thermal efficiency and coal economy point to greatly increasing boiler pressures, and, indeed, limited only by to what degree boilers and engines can be built to withstand such pressures safely."

CONVERSION OF POWER

This period has marked the policy, on all frame renewals, to incorporate change of design from the "Mother Hubbard," (center cab type), to back cab. In accord therewith, in the preparation of design, modernization has been had through increased boiler pressures, increased cylinder sizes, improved type of valve gear, superheating where necessary, application of power reverse gears, etc., etc.

As illustrative, photographic cut is given of switcher locomotive number 81, formerly Consolidation locomotive number 1000, of the E-4 class, type 2-8-0. This locomotive originally had twenty-two by twenty-eight inch cylinders; fifty-one inch drivers; straight top type boiler, seventy-six inches in diameter; carrying a pressure of one hundred eighty pounds; firebox, ten feet one sixteenth inch long by nine feet wide; wheel base, rigid sixteen feet, total engine twenty-four feet five inches; weights, on engine truck 18,500 pounds, on drivers 157,500 pounds, total engine 176,000 pounds; heating surface 3348.54 square feet; tractive power of 41,469 pounds; tender capacity, 5000 gallons of water and 8 tons of coal. The conditions now obtaining are as per dimensional data given below photograph.

LOCOMOTIVE 81

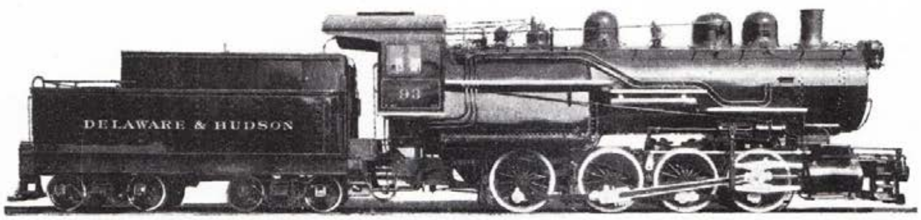


Built by American Locomotive Company in 1899, Type 2–8–0. Rebuilt by The Delaware and Hudson Company in 1924, Type 0–8–0. Gauge of Track 4'8½". Cylinders, Diameter 22", Stroke 28". Driving Wheel Diameter 51". Boiler, Straight Top, Inside Diameter 73", Pressure 200 Pounds. Firebox, Length 120¼", Width 108". Tubes, 411, Diameter 2", Length 14'0". Wheel Base, Driving 16'0", Engine 16'0", Engine and Tender 48'6¼". Weight, on Drivers 196750 Pounds, Total Engine 196750 Pounds, Engine and Tender 290000 Pounds. Fuel, Anthracite. Heating Surface, Tubes 3012.63, Fire Box 226, Total 3238.63 Square Feet. Tractive Power 46050 Pounds. Tender Capacity, Water 6000 Gallons, Fuel 9 Tons.

Photographic cut is given of locomotive number 93, formerly Consolidation locomotive number 871 of the E-3-A Class, type 2-8-0. This locomotive originally had twenty-one by thirty inch cylinders; fifty-seven inch drivers; straight top type boiler, seventy-three inches in diameter, carrying two hundred pounds steam pressure, firebox,

ten feet one eighth inch long by nine feet wide; wheel base, rigid seventeen feet, total engine twenty-five feet five inches; weights, on engine truck 23,000 pounds, on drivers 178,000 pounds, total engine 201,000 pounds; heating surface 3400.1 square feet; tractive power 40,160 pounds; tender capacity, 6800 gallons of water and 14 tons of coal. The conditions now obtaining in this respect are as per dimensional data given below photograph.

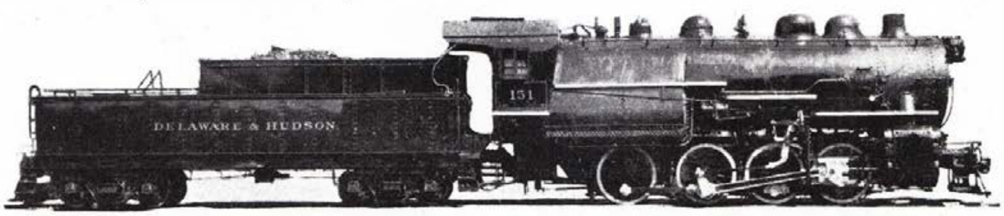
LOCOMOTIVE 93



Rebuilt by The Delaware and Hudson Company in 1925, Type 0-8-0. Gauge of Track 4'8½". Cylinders, Diameter 21½", Stroke 30". Driving Wheel Diameter 57". Boiler, Straight Top, Inside Diameter 73", Pressure 215 Pounds. Fire Box, Length 10'¼", Width 9'. Tubes 411, Diameter 2", Length 14'6". Wheel Base, Rigid 17'0", Engine 17'0", Engine and Tender 49'¼". Weight, on Drivers 208000 Pounds, Total Engine 208000 Pounds, Engine and Tender 301300 Pounds. Fuel, Anthracite. Heating Surface, Tubes 3100, Fire Box 227, Total 3327 Square Feet. Tractive Power 45350 Pounds. Tender Capacity, Water 6000 Gallons, Fuel 9 Tons.

Photographic cut is also given of locomotive number 151, formerly Consolidation locomotive number 1009, of the E-5 class, type 2-8-0. This locomotive originally had twenty-three by thirty inch cylinders; fifty-seven inch drivers; straight top type boiler, eighty-two inches in diameter, carrying two hundred ten pounds steam pressure; firebox, ten feet six and one-eighth inches long by nine feet six inches wide; wheel base, rigid seventeen feet, total engine twenty-five feet eleven inches; weights, on engine truck 29,000 pounds, on drivers 217,500 pounds, total engine 246,500 pounds; heating surface 3968 square feet; tractive power 50,585 pounds; tender capacity, 7,800 gallons of water and 14 tons of coal. The conditions now obtaining in this respect are as per dimensional data given below photograph.

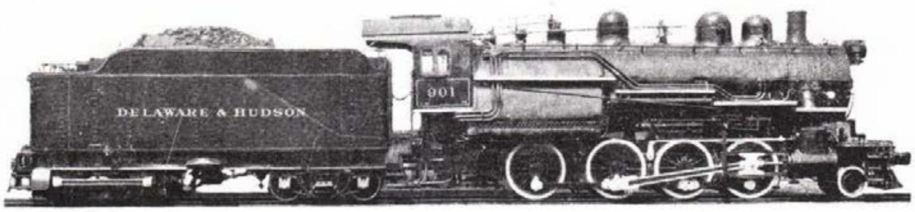
LOCOMOTIVE 151



Built by American Locomotive Company in 1906, Type 2-8-0, Rebuilt by The Delaware and Hudson Company in 1926, Type 0-8-0. Gauge of Track 4'8½". Cylinders, Diameter 25½", Stroke 30". Driving Wheel Diameter 57". Boiler, Straight Top, Inside Diameter 82", Pressure 220 Pounds. Fire Box, Length 10'6⅛", Width 9'6". Tubes, Superheater 38, Diameter 5⅜", Length 14'6", Ordinary 275, Diameter 2", Length 14'6". Wheel Base, Rigid 17', Engine 17', Engine and Tender 59'10½". Weight, on Drivers 265000 Pounds, Total Engine 265000 Pounds, Engine and Tender 404827 Pounds. Fuel, Anthracite. Heating Surface, Tubes 2843, Fire Box 257, Total 3100 Square Feet. Tractive Power 65150 Pounds, Tender Capacity, Water 9000 Gallons, Fuel 14 Tons.

Cut illustration is given of locomotive number 901, revision to back cab, without cylinder and valve gear changes on locomotive, bearing the same road number. This locomotive had twenty-one by thirty inch cylinders; fifty-seven inch drivers; straight top type boiler, seventy-three inches in diameter, carrying two hundred pounds steam pressure; firebox, ten feet one-eighth inch long by nine feet wide; wheel base, rigid seventeen feet, total engine twenty-five feet five inches; weights, on engine truck 23,000 pounds, on drivers 178,000 pounds, total engine 201,000 pounds; heating surface 3400.1 square feet; tractive power 40,160 pounds; tender capacity, 7,800 gallons of water and 14 tons of coal. The conditions now obtaining on this locomotive are as per dimensional data given below photograph.

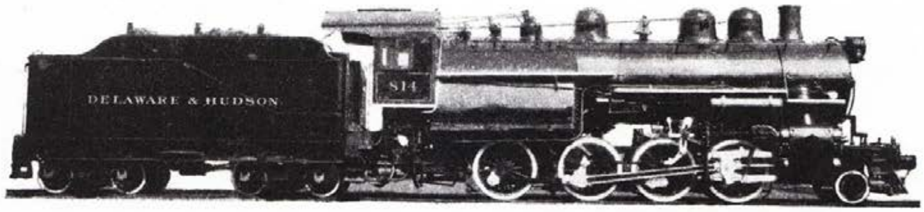
LOCOMOTIVE 901



Rebuilt by The Delaware and Hudson Company in 1925, Type 2–8–0. Gauge of Track 4′8½″. Cylinders, Diameter 21″, Stroke 30″. Driving Wheel Diameter 57″. Boiler, Straight Top, Inside Diameter 73″, Pressure 210 Pounds. Fire Box, Length 10′¼″, Width 9′. Tubes, Superheater 30, Diameter 5⅜″ OD, Length 14′, Regular 210, Diameter 2″ OD, Length 14′. Wheel Base, Rigid 17′, Engine 25′5″, Engine and Tender 62′10¾″. Weight, on Truck 24000 Pounds, Drivers 200500 Pounds, Total Engine 224500 Pounds, Engine and Tender 342100 Pounds. Fuel, Anthracite. Heating Surface, Tubes 2116, Fire Box 227, Total 2343 Square Feet. Tractive Power 42150 Pounds. Tender Capacity, Water 7800 Gallons, Fuel 14 Tons.

Experience in cross-checks, after the change of two in this manner, has indicated the wisdom of the discontinuance of this type of conversion, and all locomotives of this class now being converted have increased diameter piston valve cylinders, rather than continuance of the slide valve with Universal chests, the Walschaert type gear, illustration being given by cut of locomotive number 814, which formerly had twenty-one by thirty inch cylinders; fifty-seven inch drivers; straight top type boiler seventy-three inches in diameter, carrying two hundred pounds steam pressure; firebox, ten feet three-eighths inch long by nine feet one-eighth inch wide; wheel base, rigid seventeen feet, total engine twenty-five feet five inches; weights, on engine truck 23,000 pounds, on drivers 172,000 pounds, total engine 195,000 pounds; heating surface, 3400.1 square feet; tractive power 40,160 pounds; tender capacity 6,000 gallons of water and 9 tons of coal. Conditions obtaining on this locomotive now are as per dimensional data appearing below photograph.

LOCOMOTIVE 814

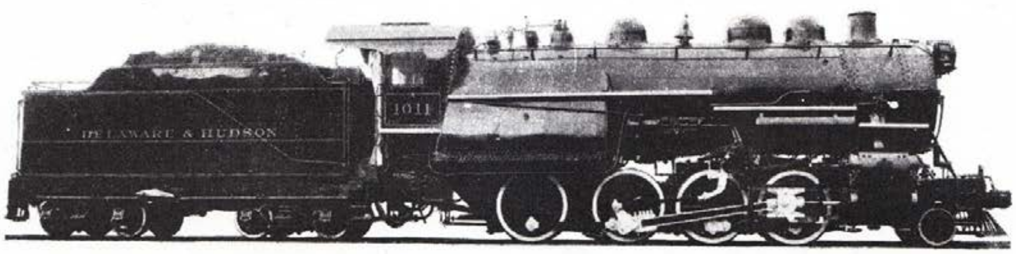


Rebuilt by The Delaware and Hudson Company in 1925, Type 2-8-0. Gauge of Track 4'8½". Cylinders, Diameter 23", Stroke 30". Driving Wheel Diameter 57". Boiler Straight Top, Inside Diameter 73", Pressure 210 Pounds. Fire Box, Length 10'¼", Width 9'. Tubes, Superheater 30, Diameter 5⅜" OD, Length 14'; Regular 210, Diameter 2" OD, Length 14'. Wheel Base, Rigid 17', Engine 25'5", Engine and Tender 62'10¾". Weight, on Truck 24000 Pounds, Drivers 204600 Pounds, Total Engine 228600 Pounds, Engine and Tender 346200 Pounds. Fuel, Anthracite. Heating Surface, Tubes 2116, Fire Box 227, Total 2343 Square Feet. Tractive Power 50600 Pounds. Tender Capacity, Water 7800 Gallons, Fuel 14 Tons.

As illustrative of the resultant of the changes in this particular class of power, the following is of interest. Previous to conversion, the tonnage northbound in the Wilkes-Barre-Oneonta manifest pool was 2250.—with this locomotive as changed same was increased to 2,600 tons northbound. Southbound, prior to conversion, 1,750 tons and as converted 2,050 tons. This pool, requiring eighteen locomotives, has now been filled with locomotives of this converted type.

Cut illustration is also given of locomotive number 1011, which in original form as received on the road, is illustrated on page number 61, the dimensional data being, cylinders twenty-three by thirty inches; fifty-seven inch drivers; straight top type boiler, eighty-two inches in diameter, carrying a pressure of two hundred ten pounds; firebox, ten feet six and one-eighth inches long by nine feet six inches wide; wheel base, rigid seventeen feet, total engine twenty-five feet eleven inches; weights, on engine truck 29,000 pounds, on drivers 217,500 pounds, total engine 246,500 pounds; heating surface 3968 square feet; tractive power 49,690 pounds; tender capacity, 7,800 gallons of water and 14 tons of coal. Conditions now obtaining on this locomotive are as per dimensional data given below photograph.

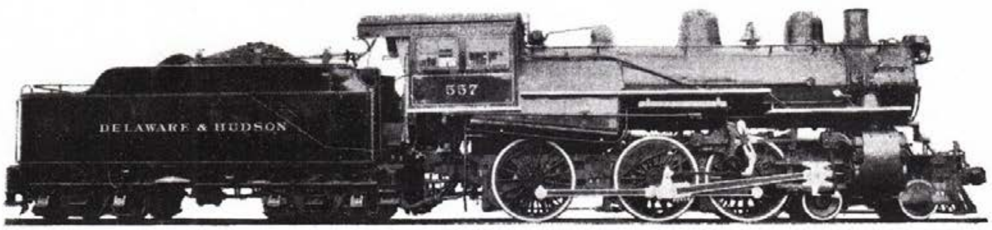
LOCOMOTIVE 1011



Built by American Locomotive Company in 1907, Type 2-8-0. Rebuilt by The Delaware and Hudson Company in 1925, Type 2-8-0. Gauge of Track 4'8½". Cylinders, Diameter 25", Stroke 30". Driving Wheel Diameter 57". Boiler, Type, Straight Top, Inside Diameter 82". Pressure 200 Pounds. Firebox, Length 126⅛", Width 114". Tubes, Superheater 38, Diameter 5⅜", Length 14'6"; Ordinary 275, Diameter 2", Length 14'6". Wheel Base, Driving 17', Engine 25'11", Engine and Tender 59'9¼". Weight, Engine Truck 30150 Pounds, Drivers 231700 Pounds, Total Engine 261850 Pounds, Engine and Tender 382700 Pounds. Fuel, Anthracite. Heating Surface, Tubes 2843, Firebox 257, Total 3100 Square Feet. Tractive Power 56900 Pounds. Tender Capacity, Water 7800 Gallons, Coal 14 Tons.

Photograghic illustration is also given of locomotive number 557, originally center cab type, similar to locomotive number 507 shown on page number 60, except as to diameter of drivers and use of Walschaert gear. This locomotive had twenty-one by twenty-six inch cylinders; sixty-three inch drivers; straight top type boiler, sixty-five inches in diameter, carrying two hundred pounds steam pressure; firebox, nine feet eleven and seven-eighths inches long by eight feet six inches wide; wheel base, rigid fifteen feet, total twenty-six feet four inches; weights, on engine truck 52,500 pounds, on drivers 134,000 pounds, total engine 186,500 pounds; heating surface 2583.9 square feet; tractive power 31440 pounds; tender capacity, 6800 gallons of water and 14 tons of coal. The conditions now obtaining on this locomotive are as per dimensional data given beneath photograph.

LOCOMOTIVE 557



Built by American Locomotive Company in 1907, Type 4-6-0. Rebuilt by the Delaware and Hudson Company in 1926, Type 4-6-0. Gauge of Track 4′8½″. Cylinders, Diameter 22″, Stroke 26″. Driving Wheel Diameter 72″. Boiler, Type, Straight Top, Inside Diameter 65″, Pressure 225 Pounds. Firebox, Length 119⅞″, Width 102″. Tubes, Superheater 24, Diameter 5⅜″, Length 14′6″; Ordinary 163, Diameter 2″, Length 14′6″. Wheel Base, Driving 15′, Engine 26′5″, Engine and Tender 59′0″. Weight, on Engine Truck 48000 Pounds, Drivers 156800 Pounds, Total Engine 204800 Pounds, Engine and Tender 320000 Pounds. Fuel, Anthracite. Heating Surface, Tubes 1717, Firebox 180, Total 1897 Square Feet. Tractive Power 34000 Pounds. Tender Capacity, Water 8000 Gallons, Coal 14 Tons.

As illustrative of the progress of this work, it is contemplated that in excess of thirty locomotives will be changed in the year 1926.

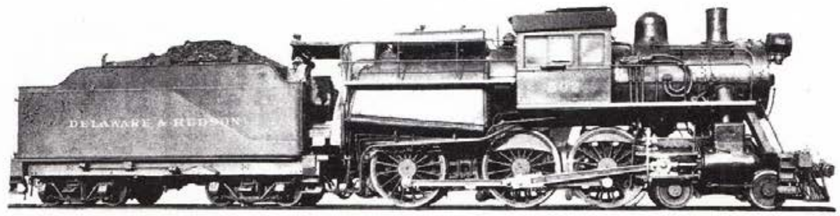
This conversion policy has also a very decided advantage in the balancing of Colonie Shop during periods of depression on the railroad, permitting a reasonable working schedule with resulting improved power conditions.

* * * * * *

In general, in America during this period there has been a decided awakening as to the importance of Motive Power, not alone as to the design but also of its operation. As illustrative, to increase mileage, the practice has become quite common of running power over two or more divisions, some phenomenal records having been made in this respect and well recorded. The possibilities vary with the characteristics of the road and the field for improvement is also dependent, in a measure, on the type of locomotive, the fuel used and the terminal facilities provided. Intensive roundhouse handling also has as its object the accomplishment of this purpose. The following table taken from the "Summary of Operating Statistics, Class Number 1 Railways," clearly develops the progress made by some of the major railroads in this respect in the last three years.

CLASS D-3 CONVERSIONS

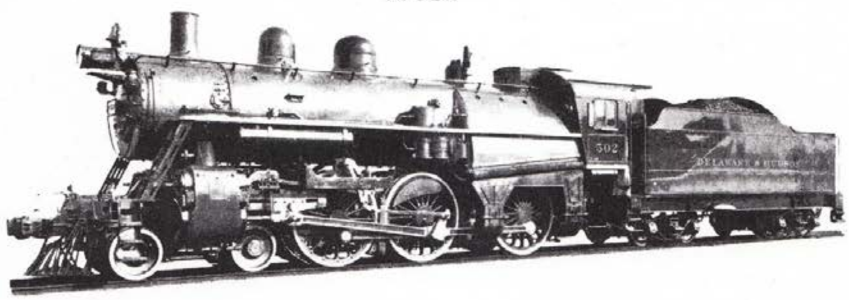
BEFORE



LOCOMOTIVE 502

Built by American Locomotive Company in 1903. Type 4-6-0. Gauge of Track 4'8½". Cylinders, Diameter 21", Stroke 26". Driving Wheel Diameter 72". Boiler Straight Top. Inside Diameter 65", Pressure 200 Pounds. Fire Box, Length 119⅞", Width 102". Tubes 308, Diameter 2", Length 15'0". Wheel Base, Driving 15'0", Engine 26'4", Engine and Tender 53'7½". Weight, on Engine Truck 43500 Pounds, Drivers 131500 Pounds, Total Engine 175000 Pounds, Engine and Tender 299167 Pounds. Fuel, Anthracite. Heating Surface, Total 2663.72 Square Feet. Tractive Power 27450 Pounds. Tender Capacity, Water 6500 Gallons, Fuel 12 Tons. Some Locomotives in this class were superheated 1915-to-1926.

AFTER



LOCOMOTIVE 502

Rebuilt by The Delaware and Hudson Railroad Corporation in 1926-To-1931. Type 4-6-0. Gauge of Track 4'8½". Cylinders, Diameter 22", Stroke 26". Driving Wheel Diameter 72". Boiler, Straight Top, Inside Diameter 65", Pressure 225 Pounds. Fire Box, Length 119⅞", Width 102". Tubes, Superheater 24, Diameter 5⅜", Length 14'6", Ordinary 163, Diameter 2", Length 14'6". Wheel Base, Driving 15'0", Engine 26'5", Engine and Tender 62'3". Weight, on Engine Truck 48000 Pounds, Drivers 160000 Pounds, Total Engine 208000 Pounds, Engine and Tender 343000 Pounds. Fuel, Anthracite and Bituminous. Heating Surface: Tubes 1717, Fire Box 180, Total 1897 Square Feet, Superheater 422 Square Feet. Tractive Power 34000 Pounds. Tender Capacity, Water 8000 Gallons, Fuel 14 Tons.

Conversions of this class during the Decade were as follows:

Year	1926	1 Locomotive
	1927	3 Locomotives
	1928	3 Locomotives
	1929	6 Locomotives
	1930	1 Locomotive
	1931	1 Locomotive
Total		15 Locomotives

CLASS E-3-A CONVERSIONS

BEFORE

LOCOMOTIVE 793

Built by American Locomotive Company in 1903. Type 2-8-0. Gauge of Track 4'8½". Cylinders, Diameter 21", Stroke 30". Driving Wheel Diameter 57". Boiler, Straight Top. Inside Diameter 73", Pressure 190 Pounds. Fire Box, Length 120⅜", Width 108⅛". Tubes 411. Diameter 2", Length 14'6". Wheel Base, Driving 17'0", Engine 25'5", Engine and Tender 53'6". Weight, on Engine Truck 23000 Pounds, Drivers 172000 Pounds. Total Engine 195000 Pounds. Engine and Tender 307000 Pounds. Fuel, Culm. Heating Surface 3407.8 Square Feet. Tractive Power 38150 Pounds. Tender Capacity, Water 6000 Gallons, Fuel 9 Tons. Some Locomotives in this class were superheated 1915-to-1926.

AFTER

LOCOMOTIVE 953

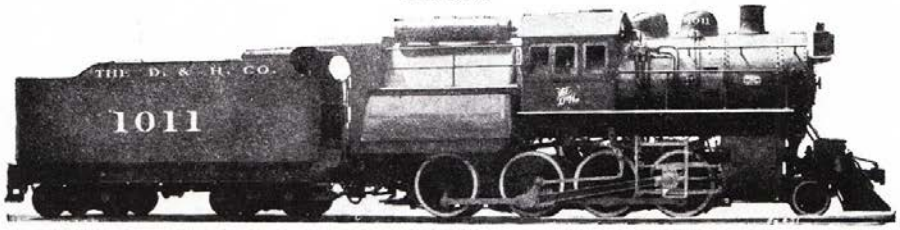
Rebuilt by The Delaware and Hudson Railroad Corporation in 1926-To-1930. Type 2-8-0. Gauge of Track 4'8½". Cylinders, Diameter 23", Stroke 30". Driving Wheel Diameter 57". Boiler, Straight Top, Inside Diameter 73", Pressure 210 Pounds. Fire Box, Length 120¼", Width 108". Tubes, Superheater 30, Diameter 5⅜", Length 14'0", Ordinary 210, Diameter 2", Length 14'0". Wheel Base, Driving 17'0", Engine 25'5", Engine and Tender 61'10¼". Weight, on Engine Truck 21400 Pounds, Drivers 214600 Pounds, Total Engine 236000 Pounds, Engine and Tender 375900 Pounds. Fuel, Bituminous. Heating Surface: Tubes 2116, Fire Box 227, Arch Tubes 39.19, Total 2382.19 Square Feet, Superheater 509 Square Feet. Tractive Power 50600 Pounds. Tender Capacity, Water 9000 Gallons, Fuel 19 Tons.

Conversions of this class during the Decade were as follows:

Year 1926	15 Locomotives
1927	14 Locomotives
1928	3 Locomotives
1929	1 Locomotive
1930	2 Locomotives
Total	35 Locomotives

CLASS E-5 CONVERSIONS

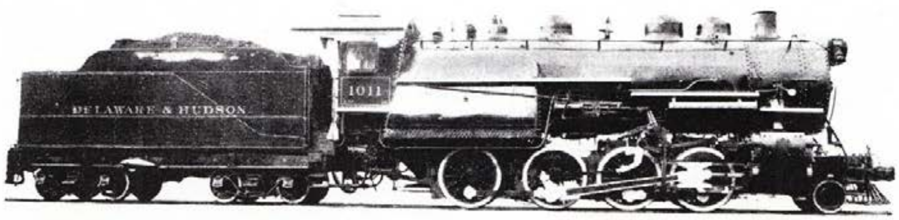
BEFORE



LOCOMOTIVE 1011

Built by American Locomotive Company in 1906, Class E-5. Gauge of Track 4'8½". Cylinders, Diameter 23", Stroke 30". Driving Wheel Diameter 57". Boiler, Diameter 82", Pressure 210 Pounds. Fire Box, Length 126⅛", Width 114". Tubes 493, Diameter 2", Length 14'6". Wheel Base, Driving 17'0", Engine 25'11", Engine and Tender 57'7¾". Weight in Working Order, Leading 29000 Pounds, Driving 217500 Pounds, Engine 246500 Pounds, Engine and Tender 399300 Pounds. Fuel, Anthracite. Heating Surface, Total 3968 Square Feet. Tractive Power 49690 Pounds. Tender Capacity, Water 7800 Gallons, Fuel 14 Tons. Locomotives in this class were superheated 1912-to-1917.

AFTER



LOCOMOTIVE 1011

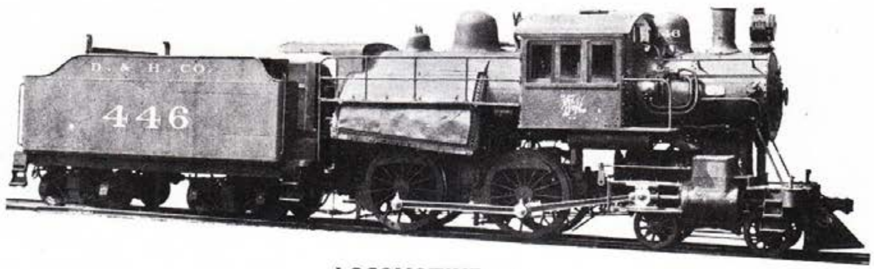
Rebuilt by The Delaware and Hudson Railroad Corporation 1926-To-1930. Type 2-8-0. Gauge of Track 4'8½". Cylinders, Diameter 25", Stroke 30". Driving Wheel Diameter 57". Boiler, Straight Top, Inside Diameter 82", Pressure 200 Pounds. Fire Box, Length 126⅛", Width 114". Tubes, Superheater 38, Diameter 5⅜", Length 14'6", Ordinary 275, Diameter 2", Length 14'6". Wheel Base, Driving 17'0", Engine 25'11", Engine and Tender 63'3¼". Weight, on Engine Truck 27900 Pounds, Drivers 241300 Pounds, Total Engine 269200 Pounds, Engine and Tender 408500 Pounds. Fuel, Bituminous. Heating Surface: Tubes 2843, Fire Box 257, Arch Tubes 60, Total 3160 Square Feet, Superheater 671 Square Feet. Tractive Power 56900 Pounds. Tender Capacity, Water 9000 Gallons, Fuel 14 Tons.

Conversions of this class during the Decade were as follows:

Year	1926	4 Locomotives
	1927	10 Locomotives
	1928	1 Locomotive
	1930	4 Locomotives
Total		19 Locomotives

CLASS G-5 CONVERSIONS

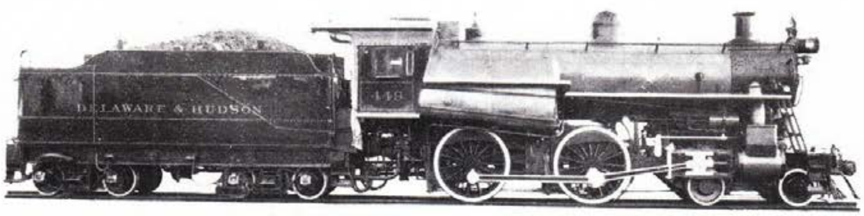
BEFORE



LOCOMOTIVE 446

Built by American Locomotive Company in 1903, Class G-5. Gauge of Track 4'8½". Cylinders, Diameter 20", Stroke 24". Driving Wheel Diameter 69". Boiler, Diameter 62", Pressure 190 Pounds. Fire Box, Length 9'11-13/16", Width 96". Tubes, 301, Diameter 2", Length 12'6". Wheel Base, Driving 8'6", Engine 23'6", Engine and Tender 51'10¾". Weight in Working Order, Leading 52000 Pounds, Driving 93500 Pounds, Engine 145500 Pounds, Engine and Tender 259000 Pounds. Fuel, Anthracite. Heating Surface: Total 2215 Square Feet. Tractive Power 22800 Pounds. Tender Capacity, Water 6000 Gallons, Fuel 8 Tons. Some Locomotives in this class were superheated 1916-to-1926.

AFTER



LOCOMOTIVE 449

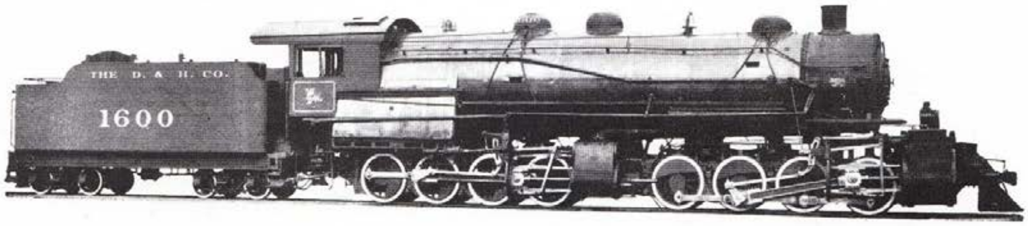
Rebuilt by The Delaware and Hudson Railroad Corporation in 1927-To-1929. Type 4-4-0. Gauge of Track 4'8½". Cylinders, Diameter 20½", Stroke 24". Driving Wheel Diameter 69". Boiler, Straight Top, Inside Diameter 62", Pressure 200 Pounds. Fire Box, Length 119⅞", Width 96". Tubes, Superheater 24, Diameter 5⅜", Length 12'0". Ordinary 160, Diameter 2", Length 12'0". Wheel Base, Driving 9'0", Engine 23'11", Engine and Tender 56'5". Weight, on Engine Truck 57100 Pounds, Drivers 100,600 Pounds, Total Engine 157700 Pounds, Engine and Tender 272900 Pounds. Fuel, Anthracite and Bituminous. Heating Surface: Tubes 1437, Fire Box 180, Total 1617 Square Feet, Superheater 344 Square Feet. Tractive Power 25200 Pounds. Tender Capacity, Water 6800 Gallons, Fuel 14 Tons.

Conversions of this class during the Decade were as follows

Year 1927	2 Locomotives
1928	2 Locomotives
1929	3 Locomotives
Total	7 Locomotives

CLASS H REBUILDS

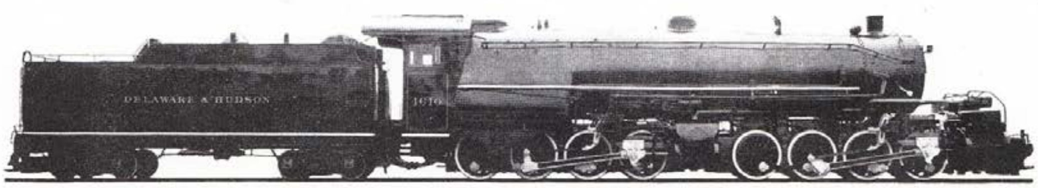
BEFORE



LOCOMOTIVE 1600

Built by American Locomotive Company in 1910. Type 0-8-8-0. Gauge of Track 4'8½". Cylinders, HP. Diameter 26", Stroke 28", LP. Diameter 41" Stroke 28". Driving Wheel Diameter 51". Boiler, Straight Top, Inside Diameter 88", Pressure 220 Pounds. Fire Box, Length 10'6⅛", Width 9'6". Tubes 446, Diameter 2¼", Length 24'. Wheel Base, Driving 14'9" and 14'9", Engine 40'2", Engine and Tender 75'7¼". Weight, on Drivers 445000 Pounds, Total Engine 445000 Pounds, Engine and Tender 611800 Pounds. Fuel, Bituminous. Heating Surface: Tubes 6277, Fire Box 350, Total 6627 Square Feet. Tractive Power 107700 Pounds Compound, 142000 Pounds Simple. Tender Capacity, Water 9000 Gallons, Fuel 14 Tons. Locomotives in this class were superheated 1911-to-1919.

AFTER

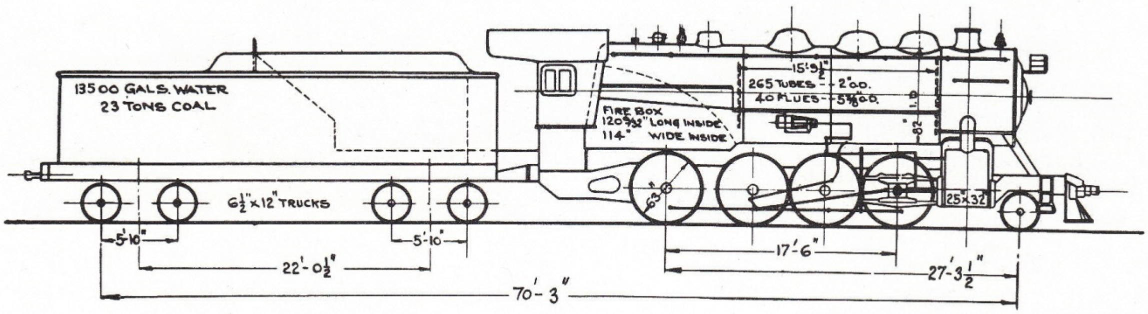


LOCOMOTIVE 1610

Rebuilt by The Delaware and Hudson Railroad Corporation in 1930-To-1935. Type 0-8-8-0. Gauge of Track 4'8½". Cylinders, Diameter H. P. 26"-L. P. 40", Stroke H. P.-L. P. 30". Driving Wheel Diameter 57". Boiler, Straight Top, Inside Diameter 88", Pressure 245 Pounds. Fire Box, Length 126⅛", Width 114". Tubes, Superheater 42, Diameter 5½", Length 24'0", Ordinary 270, Diameter 2¼", Length 24'0". Wheel Base, Driving 15'9" and 15'9", Engine 42'5", Engine and Tender 82'½". Weight, Drivers 469400 Pounds, Total Engine 469400 Pounds, Engine and Tender 647800 Pounds. Fuel, Bituminous. Heating Surface: Tubes 5245, Fire Box 353, Arch Tubes 55.36, Total 5653.36 Square Feet, Superheater 1180 Square Feet. Tractive Power 109200 Pounds, Compound, 144100 Pounds, Simple. Tender Capacity, Water 14000 Gallons, Fuel 16 Tons. Engine Frames, Commonwealth Cast Steel Locomotive Beds with Cylinders Cast Integral.

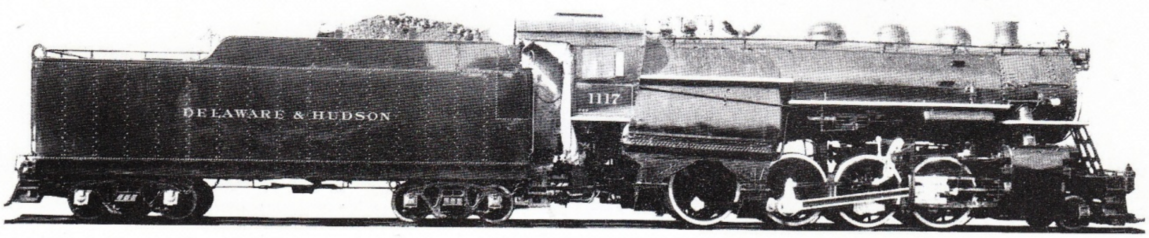
Rebuilds of this class during the Decade were as follows:

Year 1930	3 Locomotives
1932	1 Locomotive
1933	1 Locomotive
1934	1 Locomotive
1935	1 Locomotive
Total	7 Locomotives



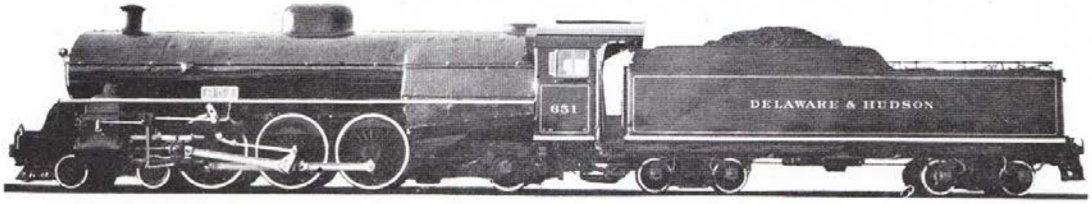
Locomotives of this class built at Colonie Shops during the Decade were as follows:

Year 1926	1 Locomotive
1927	5 Locomotives
1929	4 Locomotives
1930	2 Locomotives
Total	12 Locomotives



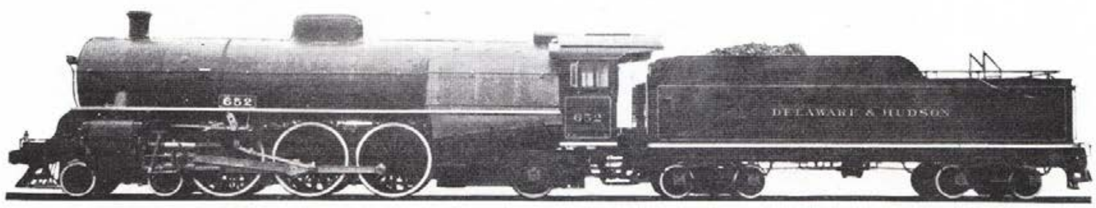
LOCOMOTIVE 1117

Built by The Delaware and Hudson Railroad Corporation in 1926-To-30. Type 2-8-0. Gauge of Track 4'8½". Cylinders, Diameter 25", Stroke 32". Driving Wheel Diameter 63". Boiler, Straight Top, Inside Diameter 82", Pressure 265-To-300 Pounds. Fire Box, Length 120-9/32", Width 114". Tubes, Superheater 40, Diameter 5⅜", Length 15'9½", Ordinary 265, Diameter 2", Length 15'9½". Weight, on Engine Truck 28000 Pounds, Drivers 270000 Pounds, Total Engine 298000 Pounds, Engine and Tender 479300 Pounds. Fuel, Bituminous. Heating Surface: Tubes 3060, Fire Box 257, Arch Tubes 60, Total 3377 Square Feet, Superheater 775 Square Feet. Tractive Power 70950-To-72700 Pounds. Tender Capacity, Water 13500 Gallons, Fuel 23 Tons. Engine Frames, Commonwealth Cast Steel Locomotive Beds with Cylinders Cast Integral. Blunt Outside Bearing Engine Truck.



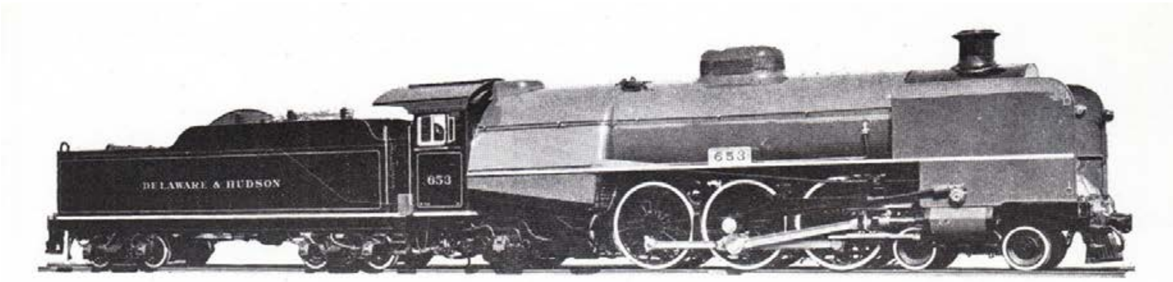
LOCOMOTIVE 651

Built by The Delaware and Hudson Railroad Corporation in 1930. Type 4-6-2. Gauge of Track 4'8½". Cylinders, Diameter 22", Stroke 28". Driving Wheel Diameter 73". Boiler, Straight Top, Inside Diameter 74½". Pressure 275 Pounds. Fire Box, Length 116⅛", Width 108". Tubes, Superheater 142, Diameter 3½", Length 19'7". Ordinary 30, Diameter 2¼", Length 19'7". Wheel Base, Driving 13'0", Engine 35'3½". Engine and Tender 74'8½". Weight, on Engine Truck 55500 Pounds, Drivers 191000 Pounds, Trailer 53500 Pounds, Total Engine 300000 Pounds, Engine and Tender 460500 Pounds. Fuel, Anthracite and Bituminous. Heating Surface: Tubes 2879, Fire Box 246, Arch Tubes 37, Total 3162 Square Feet, Superheater 1495 Square Feet. Tractive Power 44000 Pounds. Tender Capacity, Water 11000 Gallons, Fuel 14 Tons.



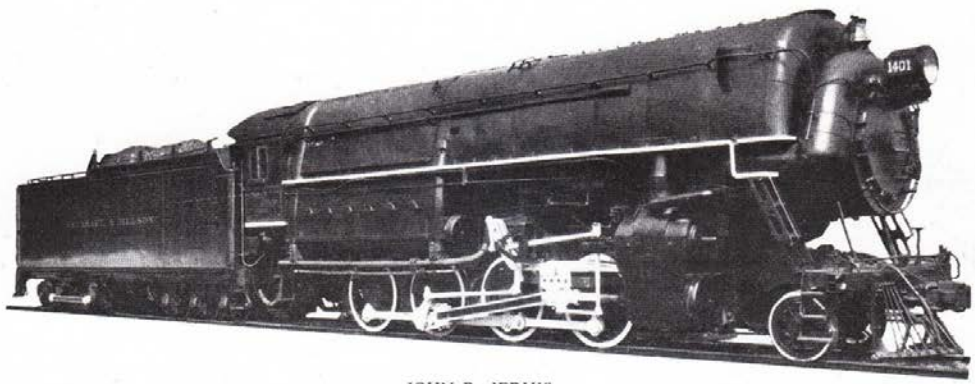
LOCOMOTIVE 652

Built by The Delaware and Hudson Railroad Corporation in 1929. Type 4-6-2. Gauge of Track 4'8½". Cylinders, Diameter 22", Stroke 28". Driving Wheel Diameter 73". Boiler, Straight Top, Inside Diameter 74½", Pressure 260 Pounds. Fire Box, Length 116⅛", Width 108". Tubes, Superheater 142, Diameter 3½", Length 19'7". Ordinary 30, Diameter 2¼", Length 19'7". Wheel Base, Driving 13'0", Engine 35'3½", Engine and Tender 74'8½". Weight, on Engine Truck 45000 Pounds, Drivers 185300 Pounds, Trailer 53000 Pounds, Total Engine 283300 Pounds, Engine and Tender 443800 Pounds. Fuel, Anthracite and Bituminous. Heating Surface: Tubes 2879, Fire Box 246, Arch Tubes 37, Total 3162 Square Feet, Superheater 1495 Square Feet. Tractive Power 41600 Pounds. Tender Capacity, Water 11000 Gallons, Fuel 14 Tons.



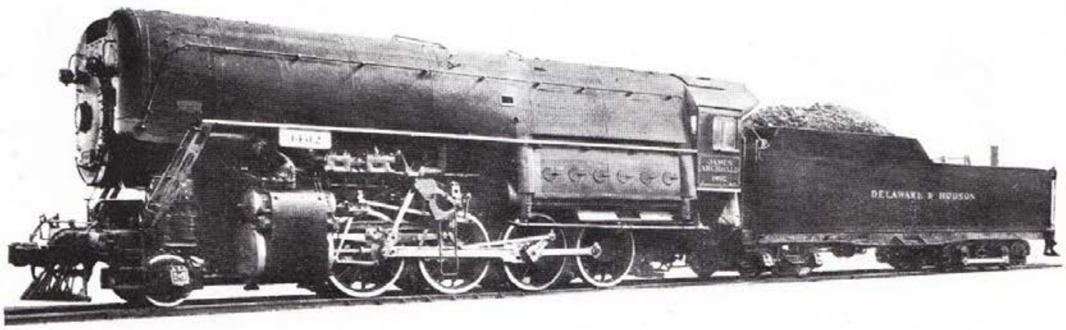
LOCOMOTIVE 653

Built by The Delaware and Hudson Railroad Corporation in 1931. Type 4-6-2. Gauge of Track 4'8½". Cylinders, Diameter 22", Stroke 32". Driving Wheel Diameter 73". Boiler, Straight Top. Inside Diameter 74-9/16". Pressure 325 Pounds. Fire Box, Length 116-1/16", Width 107⅞". Tubes, Superheater 142, Diameter 3½", Length 19'7", Ordinary 34, Diameter 2¼", Length 19'7". Wheel Base, Driving 13'0", Engine 35'3½", Engine and Tender 74'8½". Weight, on Engine Truck 50500 Pounds, Drivers 191000 Pounds, Trailer 55000 Pounds, Total Engine 296500 Pounds, Engine and Tender 457000 Pounds. Fuel, Anthracite and Bituminous. Heating Surface: Tubes 2925, Fire Box 246, Arch Tubes 37, Total 3208 Square Feet, Superheater 1495 Square Feet. Tractive Power 59500 Pounds. Tender Capacity, Water 11000 Gallons, Fuel 14 Tons. Equipped with Rotary Type Poppet Valves.



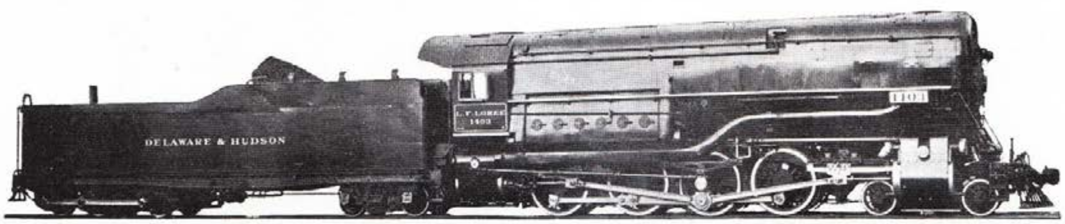
JOHN B. JERVIS

Built by American Locomotive Company in 1927. Type 2-8-0. Gauge of Track 4'8½". Cylinders, Diameter High Pressure 22¼", Low Pressure 38½", Stroke 30". Driving Wheel Diameter 57". Boiler, Water Tube Type, Diameter 61⅞", Pressure 400 Pounds. Fire Box, Length 152", Width 77⅝". Tubes, Superheater 52, Diameter 5½", Length 15'0", Regular 101, Diameter 2", Length 15'0". Wheel Base, Driving 18'0", Engine 29'0", Engine and Tender 74'11½". Weight in Working Order: Leading Truck 41500 Pounds, Driving 295000 Pounds, Engine 336500 Pounds, Engine and Tender 553400 Pounds. Fuel, Bituminous. Heating Surface: Tubes 788, Flues 1116, Fire Box 1150, Arch Tubes 67, Total 3121 Square Feet, Superheater 700 Square Feet. Tractive Power: Simple at 400 Pounds Boiler Pressure 85800 Pounds, Compound at 400 Pounds Boiler Pressure 71600 Pounds. Tender Booster at 400 Pounds Boiler Pressure 16200 Pounds. Tender Capacity, Water 12000 Gallons, Fuel 16 Tons.



JAMES ARCHBALD

Built by American Locomotive Company in 1930. Type 2-8-0. Gauge of Track 4'8½". Cylinders, Diameter High Pressure 20½", Low Pressure 35½", Stroke 32". Driving Wheel Diameter 63". Boiler, Water Tube Type, Diameter 68-1/16", Pressure 500 Pounds. Fire Box, Length 151-15/16", Width 77-⅝". Tubes, Superheater 52, Diameter 5½", Length 15'0", Regular 155, Diameter 2", Length 15'0". Wheel Base, Driving 18'0", Engine 29'0", Engine and Tender 80'½". Weight in Working Order: Leading Truck 56000 Pounds, Driving 300000 Pounds, Engine 356000 Pounds. Engine and Tender 582600 Pounds. Fuel, Bituminous. Heating Surface: Tubes 1209, Flues 1116, Fire Box 1048, Arch Tubes 66, Total 3439 Square Feet, Superheater 1037 Square Feet. Tractive Power: Simple at 500 Pounds Boiler Pressure 85800 Pounds, Compound at 500 Pounds Boiler Pressure 71600 Pounds. Tender Booster at 250 Pounds Boiler Pressure 18000 Pounds. Tender Capacity, Water 14000 Gallons, Fuel 17½ Tons.



L. F. LOREE

Built by American Locomotive Company in 1933. Type 4-8-0. Gauge of Track 4'8½". Cylinders, Diameter High Pressure 20", Intermediate Pressure 27½", Low Pressure 33", Stroke 32". Driving Wheel Diameter 63". Boiler, Water Tube Type, Diameter 68-1/16". Pressure 500 Pounds. Fire Box, Length 139-15/16", Width 77¾". Tubes, Superheater 52, Diameter 5½", Length 15'0", Regular 155, Diameter 2", Length 15'0". Wheel Base, Driving 18'10", Engine 33'9", Engine and Tender 83'8¾". Weight in Working Order: Leading Truck 69000 Pounds, Driving 313000 Pounds. Engine 382000 Pounds. Engine and Tender 608400 Pounds. Fuel, Bituminous. Heating Surface: Tubes 1209, Flues 1116, Fire Box 965, Arch Tubes 61, Total 3351 Square Feet, Superheater 1076 Square Feet. Tractive Power: Simple at 500 Pounds Boiler Pressure 91500 Pounds, Triple at 500 Pounds Boiler Pressure 76200 Pounds. Tender Booster at 500 Pounds Boiler Pressure 18000 Pounds. Tender Capacity, Water 14000 Gallons, Fuel 17½ Tons. Equipped with Rotary Type Poppet Valves, Roller Bearings on Main Axle Boxes, Roller Bearings on Side and Main Rod Bearings of Main Crank Pin.

9. *Inspection of Lines : :, June 4th to June 7th, 1936,* pp. 11-56

Rolland Curtis Bates Jr.,
89 Leroy St.
Binghamton, New York.

The
Delaware and Hudson Railroad
Corporation

BOARD *of* DIRECTORS

INSPECTION
of LINES : :

JUNE 4th to JUNE 7th, 1936

Preface

The historical outline of the locomotive and other equipment development of your railroad was presented to you in 1926 and 1927.

Since that time the development seems to warrant further notice.

Your Master Car Builder, Mr. Ditmore, and your Superintendent of Motive Power, Mr. Edmonds, have therefore prepared the following chapters bringing the work to date.

J. T. L.

Office of the
Vice-President and General Manager,
Albany, New York,
June 1st, 1936.

Motive Power on The Delaware and Hudson

"L. F. Loree," Locomotive 1403, in Susquehanna Valley

Foreword

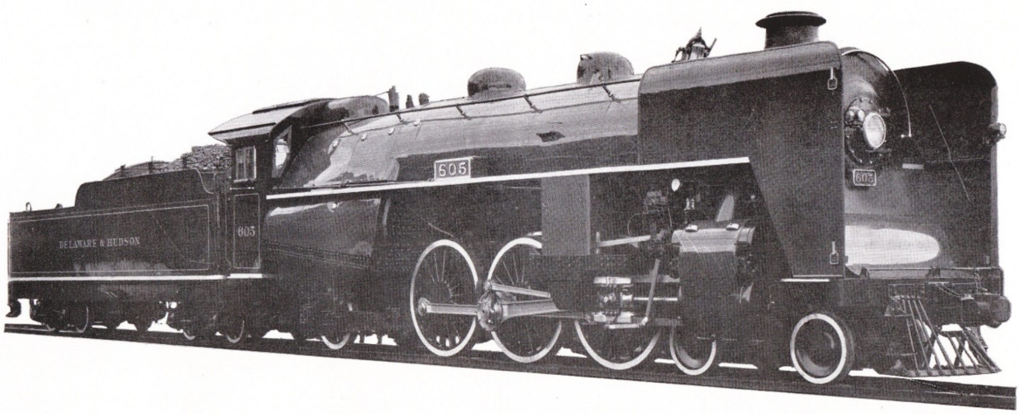
It is significant, this year 1936 marks the Bicentenary of James Watt through whose genius and his steam engine, civilization has been immeasurably benefited.

Today his thoughtful followers having to do with the steam locomotive view with calmness its very much heralded replacement by other types of motivating agents realizing, if ever, it will be of the TOMORROW but not the day after TODAY.

Development work is rarely News but rather the results of continued painstaking effort, often accompanied by discouragement, and should have enthusiasm tempered with constructive conservatism and sound judgment.

The Motive Power changes on the Delaware and Hudson and your contribution to its improvement in this Decade are herein briefly recorded.

Albany, N. Y.,
June 1, 1936


605
DELAWARE & HUDSON
605

Status of the Steam Locomotive

In the spring of 1926 it fell to my lot to prepare a brief history of the Motive Power on the Delaware and Hudson from its inception to June 1 of that year. It is now my instructed privilege to pick up this narrative and carry through the intervening Decade.

Quoting from page 87 of the 1926 book, one may read the following significant statement:

Quoting: "In a very recent issue of one of the New York dailies, we read as follows:

'The steam locomotive has not yet gone the way of prehistoric man; nor has it yet become an object of curiosity for the museum. Nevertheless, the huge black giants that haul our fast express and our freights back and forth across the country may well prick up their ears and look a little nervously at the sight of an oil-electric locomotive bowling along the rails without smoke or steam, and drawing behind it a heavy train of cars.' "

Interestingly, ten years later, the steam locomotive is still pricking up its ears looking and looking.

There were in the United States as of January, 1936, 45,172 steam locomotives. Late in 1935 there were 176 Diesel locomotives and 55 rail cars driven by this power in regular service with 14 such locomotives sold and in process of construction. A very large majority of these Diesels were for switching use. FOR ROAD SERVICE WE FIND THEM RELATIVELY AT THE BEGINNING OF THE EXPERIMENTAL STAGE, WITH A RIGHT-OF-WAY FRAUGHT WITH PROBLEMS BEFORE THE GOAL IS REACHED.

Yet, in the November 15, 1934 issue of the New York Times we find the following:

Quoting: "A plan to stimulate the durable goods industry was offered by John Carmody, industrial engineer and a member of the National Mediation Board in the Railway Industry. Declaring that the plan was entirely his own and had not been taken up by him with the railroads or any Federal officers, he proposed that if the government were to form a billion-dollar United States Railway Equipment Corporation it could build as many streamlined Diesel engine trains in two years as would ordinarily be built by private capital in fifteen to twenty years.

"The corporation would then rent these trains to the carriers, somewhat as the Pullman Company rents its equipment, the rate being based on reasonable time for amortizing the cost of the equipment.

"Mr. Carmody believed that if the building of the streamlined trains were promptly assigned to private railway shops an immense flood of orders would go out to machine works for tools, lathes, dies, presses and other equipment provided by the durable goods industries. He was confident that such a program would mean the re-employment of 2,000,000 men in less than a year."

Fantastic, it is admitted. Significant however as an extreme example of the information, or rather mis-information, being passed on by conservative Dailies to their readers, resulting in a majority public opinion the railroads in general have been unprogressive and so continue, as evidenced by their adherence to steam as a motivating agent.

Our considered thought as to its status in the transportation field today was ably expressed by Dr. L. K. Sillcox in an address to the Engineering Institute of Canada, made February 6, 1936

Quoting: "So many men of long experience in the technical and economic aspects of railway equipment, occupying positions of trust, express confidence in the ability of the steam locomotive to maintain its position as the chief motive power unit operating on our railways, that it may be taken as reasonably certain that, in the absence of some epoch-making development of which we at present have no knowledge, the process of generating steam in locomotive boilers will continue far into the future. One important qualification must be observed, however,—the future locomotive will be of greatly improved efficiency as a result of strict laboratory tests and road trials. This apart, there is no misinterpreting the general attitude of mind among railway mechanical officers and others concerned as to the general status of the steam locomotive in its present stage of development. Confidence in it is not based upon failure to appreciate the claims of alternative forms of traction, but the steam locomotive will endure because it provides a relatively economical, reliable, and effective means of hauling traffic at good average speeds, day in and day out, under widely divergent conditions, which call for an elasticity of service which the steam locomotive is admirably suited to fulfill."

Decade January 1, 1926, to May 1, 1936

1926 — Locomotives — 475 *1936 — Locomotives — 398*

In this Decade some 102 locomotives have been Converted or Rebuilt. 18 have been built new, 15 at Colonie Shops and 3 by the American Locomotive Co. 102 have been dismantled.

Ownership June 1, 1926 was 475; as of May 1, 1936, 398. Tractive Power June 1, 1926–19,967,050 pounds; as of May 1, 1936–19,147,650 pounds.

The pages immediately following summarize the foregoing by Classes, and by cuts give illustration of "Before and After" of Rebuilds and Conversions. The major characteristics as were, and now, will be found below each cut.

Basically, power changes have had as their foundation:

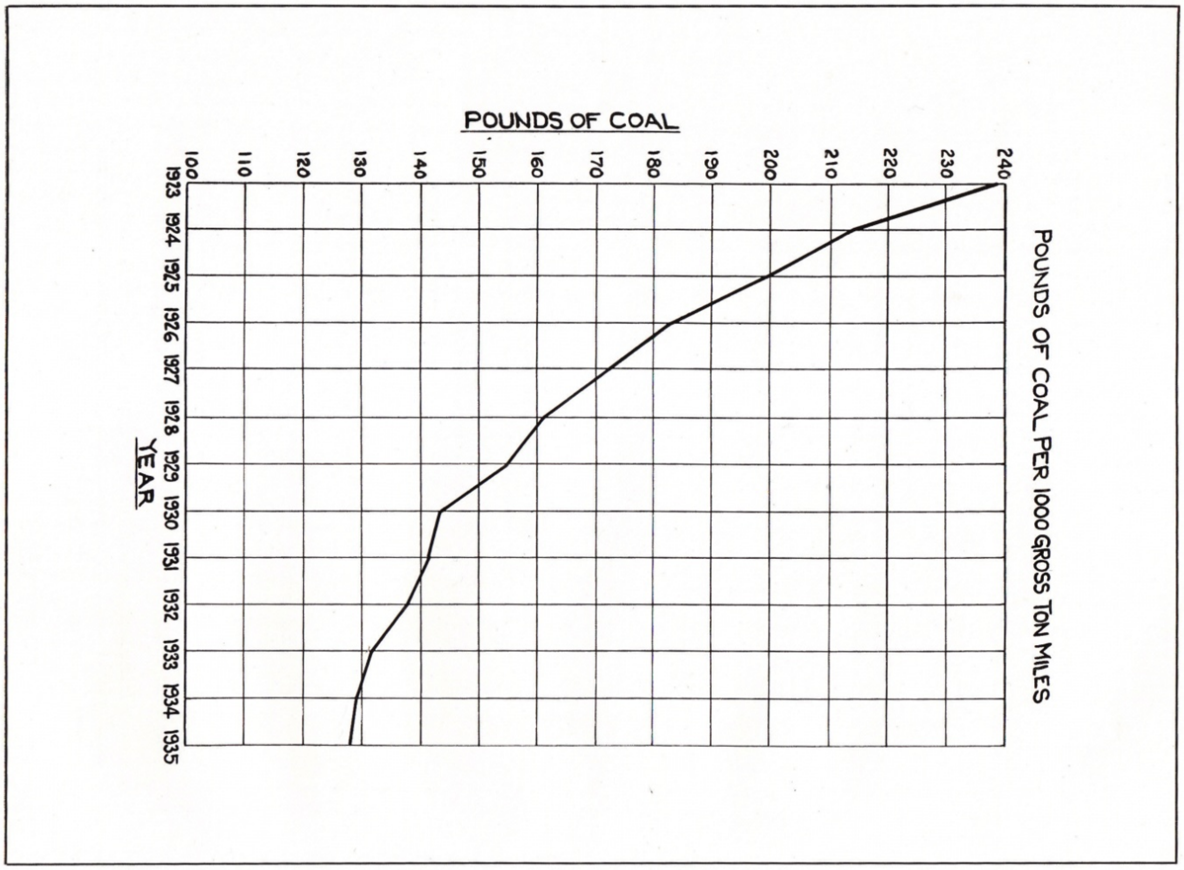
(a) Improved thermal efficiency.
(b) Reduction of maintenance costs.
(c) Better service availability.
(d) Simplification.
(e) Adaptation to a specific service.
(f) Accessibility for repair.
(g) Reduction in number of parts.

Some of the avenues for the accomplishment of these objectives are:

(a) Increase of boiler pressures where possible.
(b) Application of superheaters and with existent, additional superheating surface, thereby increasing steam temperatures.
(c) Larger diameter driving wheels where practicable.
(d) Reduced cylinder clearances and their rigid maintenance.
(e) Lightening of parts made possible by better materials.
(f) Use, to a greater extent, of cast steel.
(g) Improved lubrication of bearings.
(h) Use of roller bearings.
(i) Better valve gears.
(j) Improved Craftsmanship.
(k) Higher standards of maintenance.

That these efforts have not been devoid of results is evidenced by accompanying chart of coal consumption per thousand gross ton miles transported years 1923-1935 inclusive.

Immediately following subject matter covering "Rebuilds and Conversions" will be found similar presentation of the new Power of the Period.


POUNDS OF COAL
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
POUNDS OF COAL PER 1000 GROSS TON MILES
1923
1924
1925
1926
1927
1928
1929
1930
1931
1932
1933
1934
1935
YEAR

Decade January 1, 1926, to May 1, 1936

1926 — Locomotives — 475 *1936 — Locomotives — 398*

Recapitulation of Locomotives Built,
Rebuilt or Converted during Decade:

Converted or Rebuilt at Colonie Shops

CLASS OF LOCOMOTIVE

Year	B-7	D-3	E-3-A	E-5	G-5	H	P	Total
1926	1	1	15	4	—	—	—	21
1927	5	3	14	10	2	—	—	34
1928	5	3	3	1	2	—	—	14
1929	1	6	1	—	3	—	—	11
1930	2	1	2	4	—	3	—	12
1931	—	1	—	—	—	—	—	1
1932	—	—	—	—	—	1	—	1
1933	—	—	—	—	—	1	—	1
1934	—	—	—	—	—	1	3	4
1935	—	—	—	—	—	1	1	2
1936**	—	—	—	—	—	—	1	1
Total	14	15	35	19	7	7	5	102

**to June 1.

Built at Colonie Shops
also
*American Locomotive Co.

CLASS OF LOCOMOTIVE

Year	E-5-A	P-1	E-7	Total
1926	1	—	—	1
1927	5	—	1*	6
1929	4	1	—	5
1930	2	1	1*	4
1931	—	1	—	1
1933	—	—	1*	1
Total	12	3	3*	18

Locomotives Dismantled by Classes during Decade:
June, 1926, to May 1, 1936

Class	Type	Number of Locomotives
B	0-6-0	1
B-1-B	0-6-0	3
B-4	0-6-0	8
C-1	2-6-0	8
C-2	2-6-0	1
D-3-B	4-6-0	8
E	2-8-0	2
E-1	2-8-0	2
E-1-A	2-8-0	8
E-2	2-8-0	8
E-2-A	2-8-0	18
E-3-A	2-8-0	2
G-3	4-4-0	3
G-4	4-4-0	9
G-5	4-4-0	9
H	0-8-8-0	7*
H-1	2-6-6-0	2
P	4-6-2	2*
350	2-2-4	1
Total		102

*9 Locomotives rebuilt.

SUMMARY BY YEARS

Year		
Year 1926**	14	Locomotives
1927	7	Locomotives
1928	8	Locomotives
1929	12	Locomotives
1930	12	Locomotives
1931	7	Locomotives
1932	1	Locomotive
1933	4	Locomotives
1934	11	Locomotives
1935	20	Locomotives
1936**	6	Locomotives
Total	102	Locomotives

**1926 June 1; 1936 May 1.

CLASS B-7 CONVERSIONS

BEFORE

LOCOMOTIVE 1011

Built by American Locomotive Company in 1906, Class E-5. Gauge of Track 4'8½". Cylinders, Diameter 23", Stroke 30". Driving Wheel Diameter 57". Boiler, Diameter 82", Pressure 210 Pounds. Fire Box, Length 126⅛", Width 114". Tubes 493, Diameter 2", Length 14'6". Wheel Base, Driving 17'0", Engine 25'11", Engine and Tender 57'7¾". Weight in Working Order, Leading 29000 Pounds, Driving 217500 Pounds, Engine 246500 Pounds, Engine and Tender 399300 Pounds. Fuel, Anthracite. Heating Surface, Total 3968 Square Feet. Tractive Power 49690 Pounds. Tender Capacity, Water 7800 Gallons, Fuel 14 Tons. Locomotives in this class were superheated 1912-to-1917.

AFTER

LOCOMOTIVE 151

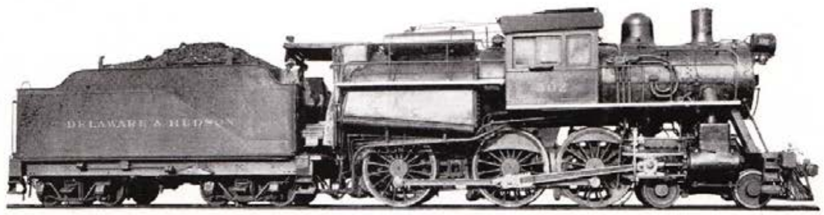
Rebuilt by The Delaware and Hudson Railroad Corporation in 1926-To-1930. Type 0-8-0. Gauge of track 4'8½". Cylinders, Diameter 25½", Stroke 30". Driving Wheel Diameter 57". Boiler, Straight Top, Inside Diameter 83¾", Pressure 225 Pounds. Fire Box, Length 126⅛", Width 114". Tubes, Superheater 38, Diameter 5⅜", Length 14'6", Ordinary 275, Diameter 2", Length 14'6". Wheel Base, Driving 17'0", Engine, 17'0", Engine and Tender 61'2½". Weight, Drivers 265000 Pounds, Total Engine 265000 Pounds, Engine and Tender 404850 Pounds. Fuel, Bituminous. Heating Surface: Tubes 2843, Fire Box 257, Arch Tubes 60, Total 3160 Square Feet, Superheater 671 Square Feet. Tractive Power 66650 Pounds. Tender Capacity, Water 9000 Gallons, Fuel 14 Tons.

Conversions of this class during the Decade were as follows:

Year 1926	2 Locomotives
1927	5 Locomotives
1928	5 Locomotives
1929	1 Locomotive
1930	1 Locomotive
Total	14 Locomotives

CLASS D-3 CONVERSIONS

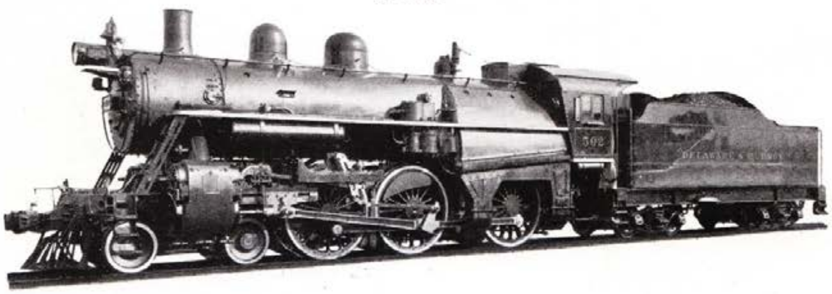
BEFORE



LOCOMOTIVE 502

Built by American Locomotive Company in 1903. Type 4-6-0. Gauge of Track 4'8½". Cylinders. Diameter 21", Stroke 26". Driving Wheel Diameter 72". Boiler Straight Top. Inside Diameter 65", Pressure 200 Pounds. Fire Box, Length 119⅞", Width 102". Tubes 308, Diameter 2", Length 15'0". Wheel Base, Driving 15'0", Engine 26'4", Engine and Tender 53'7½". Weight, on Engine Truck 43500 Pounds, Drivers 131500 Pounds, Total Engine 175000 Pounds, Engine and Tender 299167 Pounds. Fuel, Anthracite. Heating Surface, Total 2663.72 Square Feet. Tractive Power 27450 Pounds. Tender Capacity, Water 6500 Gallons, Fuel 12 Tons. Some Locomotives in this class were superheated 1915-to-1926.

AFTER



LOCOMOTIVE 502

Rebuilt by The Delaware and Hudson Railroad Corporation in 1926-To-1931. Type 4-6-0. Gauge of Track 4'8½". Cylinders, Diameter 22", Stroke 26". Driving Wheel Diameter 72". Boiler, Straight Top, Inside Diameter 65", Pressure 225 Pounds. Fire Box, Length 119⅞", Width 102". Tubes, Superheater 24, Diameter 5⅜", Length 14'6", Ordinary 163, Diameter 2", Length 14'6". Wheel Base, Driving 15'0", Engine 26'5", Engine and Tender 62'3". Weight, on Engine Truck 48000 Pounds, Drivers 160000 Pounds, Total Engine 208000 Pounds, Engine and Tender 343000 Pounds. Fuel, Anthracite and Bituminous. Heating Surface: Tubes 1717, Fire Box 180, Total 1897 Square Feet, Superheater 422 Square Feet. Tractive Power 34000 Pounds. Tender Capacity, Water 8000 Gallons, Fuel 14 Tons.

Conversions of this class during the Decade were as follows:

Year 1926	1 Locomotive
1927	3 Locomotives
1928	3 Locomotives
1929	6 Locomotives
1930	1 Locomotive
1931	1 Locomotive
Total	15 Locomotives

CLASS E-3-A CONVERSIONS

BEFORE

LOCOMOTIVE 793

Built by American Locomotive Company in 1903. Type 2-8-0. Gauge of Track 4'8½". Cylinders, Diameter 21", Stroke 30". Driving Wheel Diameter 57". Boiler, Straight Top. Inside Diameter 73", Pressure 190 Pounds. Fire Box, Length 120⅜", Width 108⅛". Tubes 411, Diameter 2", Length 14'6". Wheel Base, Driving 17'0", Engine 25'5", Engine and Tender 53'6". Weight, on Engine Truck 23000 Pounds, Drivers 172000 Pounds, Total Engine 195000 Pounds, Engine and Tender 307000 Pounds. Fuel, Culm. Heating Surface 3407.8 Square Feet. Tractive Power 38150 Pounds. Tender Capacity, Water 6000 Gallons, Fuel 9 Tons. Some Locomotives in this class were superheated 1915-to-1926.

AFTER

LOCOMOTIVE 953

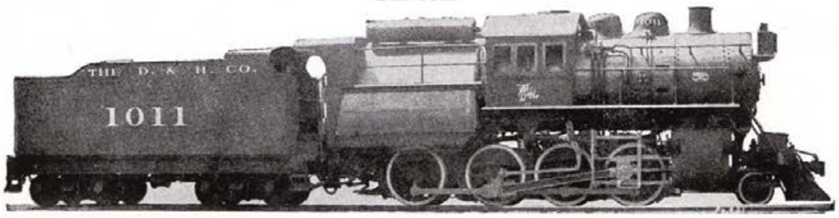
Rebuilt by The Delaware and Hudson Railroad Corporation in 1926-To-1930. Type 2-8-0. Gauge of Track 4'8½". Cylinders, Diameter 23", Stroke 30". Driving Wheel Diameter 57". Boiler, Straight Top, Inside Diameter 73", Pressure 210 Pounds. Fire Box, Length 120¼", Width 108". Tubes, Superheater 30, Diameter 5⅜", Length 14'0", Ordinary 210, Diameter 2", Length 14'0". Wheel Base, Driving 17'0", Engine 25'5", Engine and Tender 61'10¼". Weight, on Engine Truck 21400 Pounds, Drivers 214600 Pounds, Total Engine 236000 Pounds, Engine and Tender 375900 Pounds. Fuel, Bituminous. Heating Surface: Tubes 2116, Fire Box 227, Arch Tubes 39.19, Total 2382.19 Square Feet, Superheater 509 Square Feet. Tractive Power 50600 Pounds. Tender Capacity, Water 9000 Gallons, Fuel 19 Tons.

Conversions of this class during the Decade were as follows:

Year 1926	15 Locomotives
1927	14 Locomotives
1928	3 Locomotives
1929	1 Locomotive
1930	2 Locomotives
Total	35 Locomotives

CLASS E-5 CONVERSIONS

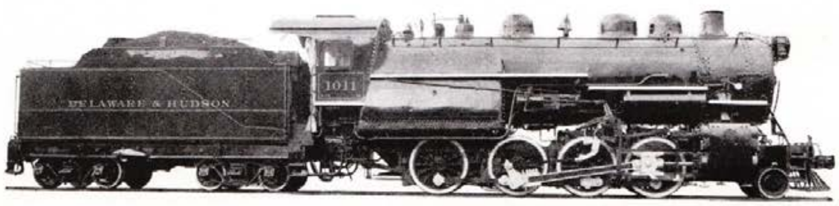
BEFORE



LOCOMOTIVE 1011

Built by American Locomotive Company in 1906, Class E-5. Gauge of Track 4'8½". Cylinders, Diameter 23", Stroke 30". Driving Wheel Diameter 57". Boiler, Diameter 82", Pressure 210 Pounds. Fire Box, Length 126⅛", Width 114". Tubes 493, Diameter 2", Length 14'6". Wheel Base, Driving 17'0", Engine 25'11", Engine and Tender 57'7¾". Weight in Working Order, Leading 29000 Pounds, Driving 217500 Pounds, Engine 246500 Pounds, Engine and Tender 399300 Pounds. Fuel, Anthracite. Heating Surface, Total 3968 Square Feet. Tractive Power 49690 Pounds. Tender Capacity, Water 7800 Gallons, Fuel 14 Tons. Locomotives in this class were superheated 1912-to-1917.

AFTER



LOCOMOTIVE 1011

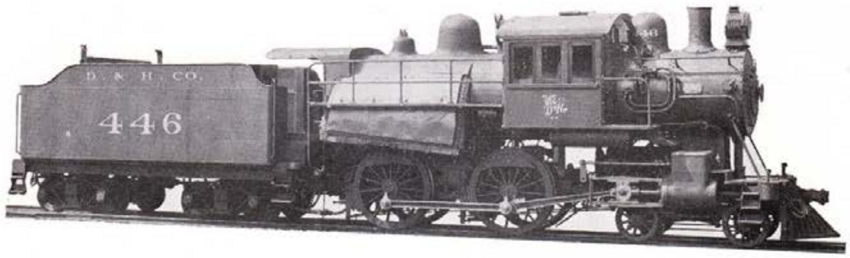
Rebuilt by The Delaware and Hudson Railroad Corporation 1926-To-1930. Type 2-8-0. Gauge of Track 4'8½". Cylinders, Diameter 25", Stroke 30". Driving Wheel Diameter 57". Boiler, Straight Top, Inside Diameter 82", Pressure 200 Pounds. Fire Box, Length 126⅛", Width 114". Tubes, Superheater 38, Diameter 5⅜", Length 14'6", Ordinary 275, Diameter 2", Length 14'6". Wheel Base, Driving 17'0", Engine 25'11", Engine and Tender 63'3¼". Weight, on Engine Truck 27900 Pounds, Drivers 241300 Pounds, Total Engine 269200 Pounds, Engine and Tender 408500 Pounds. Fuel, Bituminous. Heating Surface: Tubes 2843, Fire Box 257, Arch Tubes 60, Total 3160 Square Feet, Superheater 671 Square Feet. Tractive Power 56900 Pounds. Tender Capacity, Water 9000 Gallons, Fuel 14 Tons.

Conversions of this class during the Decade were as follows:

Year 1926	4 Locomotives
1927	10 Locomotives
1928	1 Locomotive
1930	4 Locomotives
Total	19 Locomotives

CLASS G-5 CONVERSIONS

BEFORE



LOCOMOTIVE 446

Built by American Locomotive Company in 1903, Class G-5. Gauge of Track 4'8½". Cylinders, Diameter 20", Stroke 24". Driving Wheel Diameter 69". Boiler, Diameter 62", Pressure 190 Pounds. Fire Box, Length 9'11-13/16", Width 96". Tubes, 301, Diameter 2", Length 12'6". Wheel Base, Driving 8'6", Engine 23'6", Engine and Tender 51'10¾". Weight in Working Order, Leading 52000 Pounds, Driving 93500 Pounds, Engine 145500 Pounds, Engine and Tender 259000 Pounds. Fuel, Anthracite. Heating Surface: Total 2215 Square Feet. Tractive Power 22800 Pounds. Tender Capacity, Water 6000 Gallons, Fuel 8 Tons. Some Locomotives in this class were superheated 1916-to-1926.

AFTER

LOCOMOTIVE 449

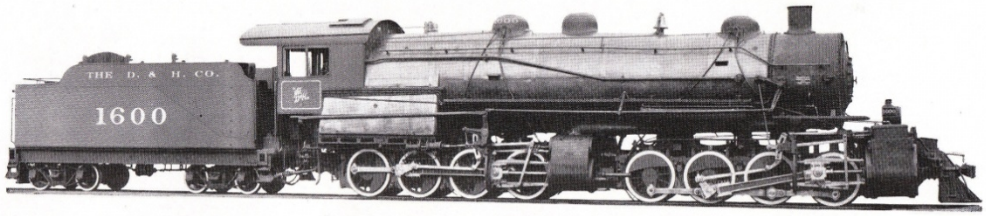
Rebuilt by The Delaware and Hudson Railroad Corporation in 1927-To-1929. Type 4-4-0. Gauge of Track 4'8½". Cylinders, Diameter 20½", Stroke 24". Driving Wheel Diameter 69". Boiler, Straight Top, Inside Diameter 62", Pressure 200 Pounds. Fire Box, Length 119⅞", Width 96". Tubes, Superheater 24, Diameter 5⅜", Length 12'0". Ordinary 160, Diameter 2", Length 12'0". Wheel Base, Driving 9'0", Engine 23'11", Engine and Tender 56'5". Weight, on Engine Truck 57100 Pounds, Drivers 100,600 Pounds, Total Engine 157700 Pounds, Engine and Tender 272900 Pounds. Fuel, Anthracite and Bituminous. Heating Surface: Tubes 1437, Fire Box 180, Total 1617 Square Feet, Superheater 344 Square Feet. Tractive Power 25200 Pounds. Tender Capacity, Water 6800 Gallons, Fuel 14 Tons.

Conversions of this class during the Decade were as follows

Year 1927	2 Locomotives
1928	2 Locomotives
1929	3 Locomotives
Total	7 Locomotives

CLASS H REBUILDS

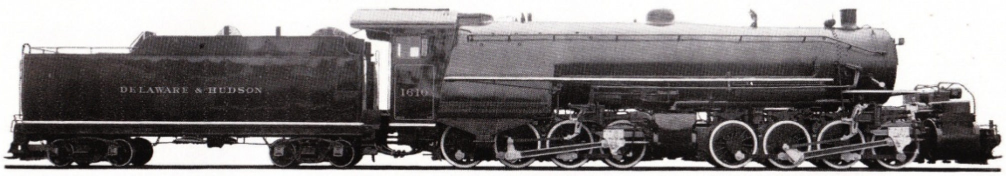
BEFORE



LOCOMOTIVE 1600

Built by American Locomotive Company in 1910. Type 0-8-8-0. Gauge of Track 4′8½″. Cylinders. HP. Diameter 26″, Stroke 28″, LP. Diameter 41″, Stroke 28″. Driving Wheel Diameter 51″. Boiler, Straight Top, Inside Diameter 88″, Pressure 220 Pounds. Fire Box, Length 10′6⅛″, Width 9′6″. Tubes 446, Diameter 2¼″, Length 24′. Wheel Base, Driving 14′9″ and 14′9″, Engine 40′2″, Engine and Tender 75′7¼″. Weight, on Drivers 445000 Pounds, Total Engine 445000 Pounds, Engine and Tender 611800 Pounds, Fuel, Bituminous. Heating Surface: Tubes 6277, Fire Box 350, Total 6627 Square Feet. Tractive Power 107700 Pounds Compound, 142000 Pounds Simple. Tender Capacity, Water 9000 Gallons, Fuel 14 Tons. Locomotives in this class were superheated 1911-to-1919.

AFTER



LOCOMOTIVE 1610

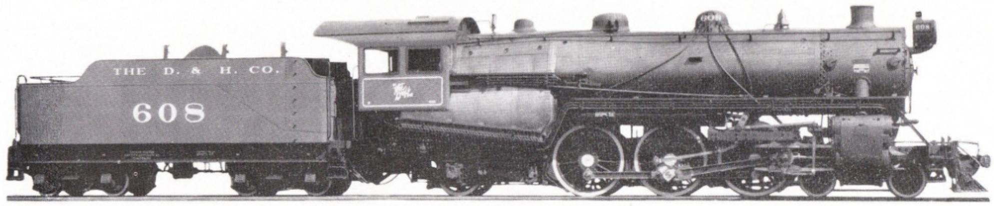
Rebuilt by The Delaware and Hudson Railroad Corporation in 1930-To-1935. Type 0-8-8-0. Gauge of Track 4'8½". Cylinders, Diameter H. P. 26"-L. P. 40", Stroke H. P.-L. P. 30". Driving Wheel Diameter 57". Boiler, Straight Top, Inside Diameter 88", Pressure 245 Pounds. Fire Box, Length 126⅛", Width 114". Tubes, Superheater 42, Diameter 5½", Length 24'0", Ordinary 270, Diameter 2¼", Length 24'0". Wheel Base, Driving 15'9" and 15'9", Engine 42'5", Engine and Tender 82'½". Weight, Drivers 469400 Pounds, Total Engine 469400 Pounds, Engine and Tender 647800 Pounds. Fuel, Bituminous. Heating Surface: Tubes 5245, Fire Box 353, Arch Tubes 55.36, Total 5653.36 Square Feet, Superheater 1180 Square Feet. Tractive Power 109200 Pounds, Compound, 144100 Pounds, Simple. Tender Capacity, Water 14000 Gallons, Fuel 16 Tons. Engine Frames, Commonwealth Cast Steel Locomotive Beds with Cylinders Cast Integral.

Rebuilds of this class during the Decade were as follows:

Year 1930	3	Locomotives
1932	1	Locomotive
1933	1	Locomotive
1934	1	Locomotive
1935	1	Locomotive
Total	7	Locomotives

CLASS P REBUILDS

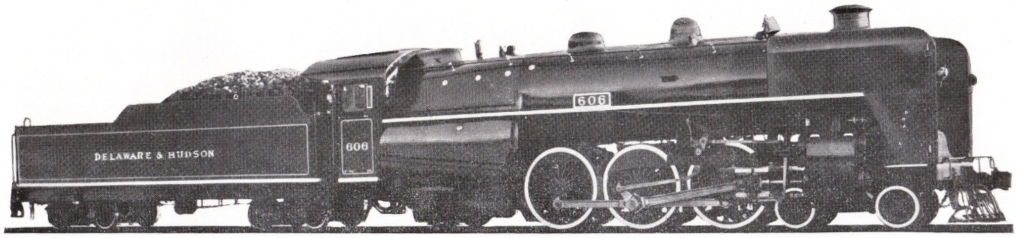
BEFORE



LOCOMOTIVE 608

Built by American Locomotive Company in 1914. Type 4-6-2. Gauge of Track 4′8½″. Cylinders, Diameter 24″, Stroke 28″. Driving Wheel Diameter 69″. Boiler, Straight Top, Inside Diameter 76 9/16″, Pressure 205 Pounds. Fire Box, Length 132⅛″, Width 108¼″. Tubes, Superheater 34, Diameter 5⅜″, Length 20′0″, Ordinary 252, Diameter 2″, Length 20′0″. Wheel Base, Driving 13′0″, Engine 34′10″, Engine and Tender 70′5¾″. Weight on Engine Truck 47500 Pounds, Drivers 191000 Pounds, Trailer 55000 Pounds, Total Engine 293500 Pounds, Engine and Tender 428500 Pounds. Fuel, Anthracite. Heating Surface: Tubes 3579, Fire Box 277, Arch Tubes 40, Total 3896 Square Feet, Superheater 796 Square Feet. Tractive Power 41350 Pounds. Tender Capacity, Water 8000 Gallons, Fuel 14 Tons.

AFTER

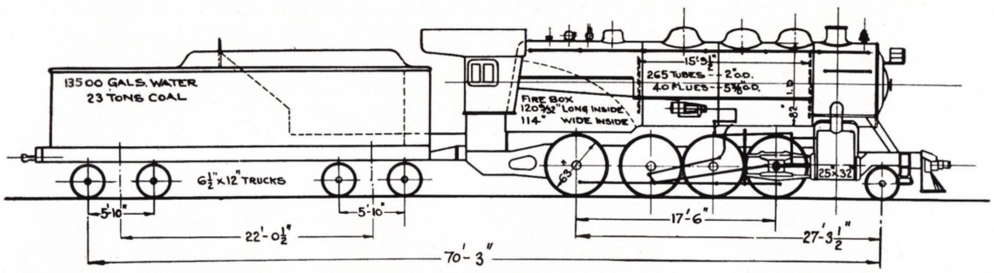


LOCOMOTIVE 606

Rebuilt by The Delaware and Hudson Railroad Corporation in 1934-To-1936. Type 4-6-2. Gauge of Track 4′8½″. Cylinders, Diameter 24″, Stroke 28″. Driving Wheel Diameter 73″. Boiler, Straight Top, Inside Diameter 76-9/16″, Pressure 225 Pounds. Fire Box, Length 132⅛″, Width 108¼″. Tubes, Superheater 34, Diameter 5⅜″, Length 20′0″, Ordinary 252, Diameter 2″, Length 20′0″. Wheel Base, Driving 13′0″, Engine 34′10″, Engine and Tender 76′8″. Weight, on Engine Truck 47500 Pounds, Drivers 192500 Pounds, Trailer 55000 Pounds, Total Engine 295000 Pounds, Engine and Tender 455500 Pounds. Fuel, Anthracite and Bituminous. Heating Surface: Tubes 3579, Fire Box 277, Arch Tubes 40, Total 3896 Square Feet, Superheater 840 Square Feet. Tractive Power 42750 Pounds. Tender Capacity, Water 11000 Gallons, Fuel 14 Tons. Equipped with Roller Bearings on Main Axle Boxes. Two Locomotives have Roller Bearings on Side and Main Rod Bearings of Main Crank Pin.

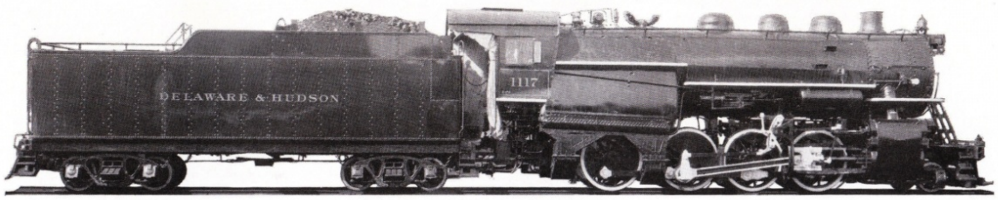
Rebuilds of this class during the Decade were as follows:

Year 1934	3 Locomotives
1935	1 Locomotive
1936	1 Locomotive
Total	5 Locomotives



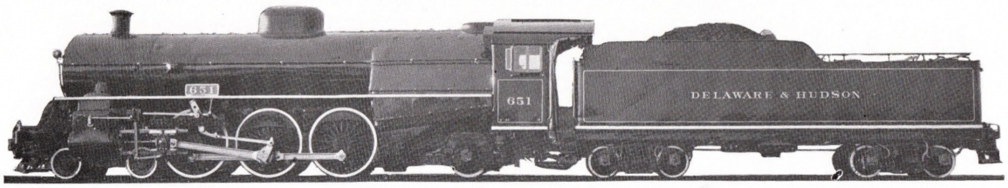
Locomotives of this class built at Colonie Shops during the Decade were as follows:

Year 1926	1	Locomotive
1927	5	Locomotives
1929	4	Locomotives
1930	2	Locomotives
Total	12	Locomotives



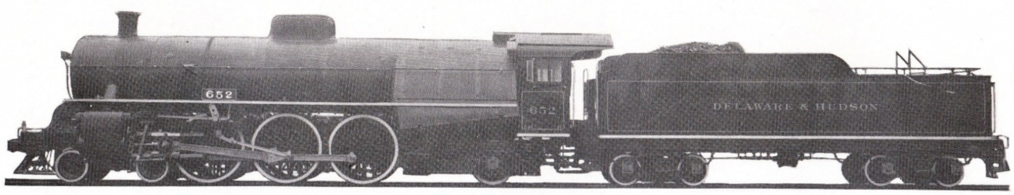
LOCOMOTIVE 1117

Built by The Delaware and Hudson Railroad Corporation in 1926-To-30. Type 2-8-0. Gauge of Track 4′8½″. Cylinders, Diameter 25″, Stroke 32″. Driving Wheel Diameter 63″. Boiler, Straight Top, Inside Diameter 82″, Pressure 265-To-300 Pounds. Fire Box, Length 120-9/32″, Width 114″. Tubes, Superheater 40, Diameter 5⅜″, Length 15′9½″, Ordinary 265, Diameter 2″, Length 15′9½″. Weight, on Engine Truck 28000 Pounds, Drivers 270000 Pounds, Total Engine 298000 Pounds, Engine and Tender 479300 Pounds. Fuel, Bituminous. Heating Surface: Tubes 3060, Fire Box 257, Arch Tubes 60, Total 3377 Square Feet, Superheater 775 Square Feet. Tractive Power 70950-To-72700 Pounds. Tender Capacity, Water 13500 Gallons, Fuel 23 Tons. Engine Frames, Commonwealth Cast Steel Locomotive Beds with Cylinders Cast Integral. Blunt Outside Bearing Engine Truck.



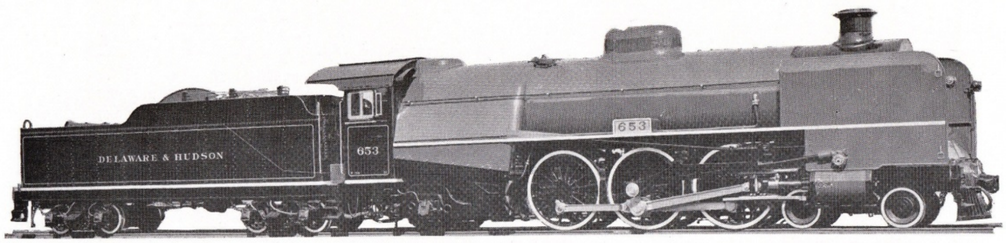
LOCOMOTIVE 651

Built by The Delaware and Hudson Railroad Corporation in 1930. Type 4-6-2. Gauge of Track 4′8½″. Cylinders, Diameter 22″, Stroke 28″. Driving Wheel Diameter 73″. Boiler, Straight Top, Inside Diameter 74½″, Pressure 275 Pounds. Fire Box, Length 116⅛″, Width 108″. Tubes, Superheater 142, Diameter 3½″, Length 19′7″, Ordinary 30, Diameter 2¼″, Length 19′7″. Wheel Base, Driving 13′0″, Engine 35′3½″, Engine and Tender 74′8½″. Weight, on Engine Truck 55500 Pounds, Drivers 191000 Pounds, Trailer 53500 Pounds, Total Engine 300000 Pounds, Engine and Tender 460500 Pounds. Fuel, Anthracite and Bituminous. Heating Surface: Tubes 2879, Fire Box 246, Arch Tubes 37, Total 3162 Square Feet, Superheater 1495 Square Feet. Tractive Power 44000 Pounds. Tender Capacity, Water 11000 Gallons, Fuel 14 Tons.



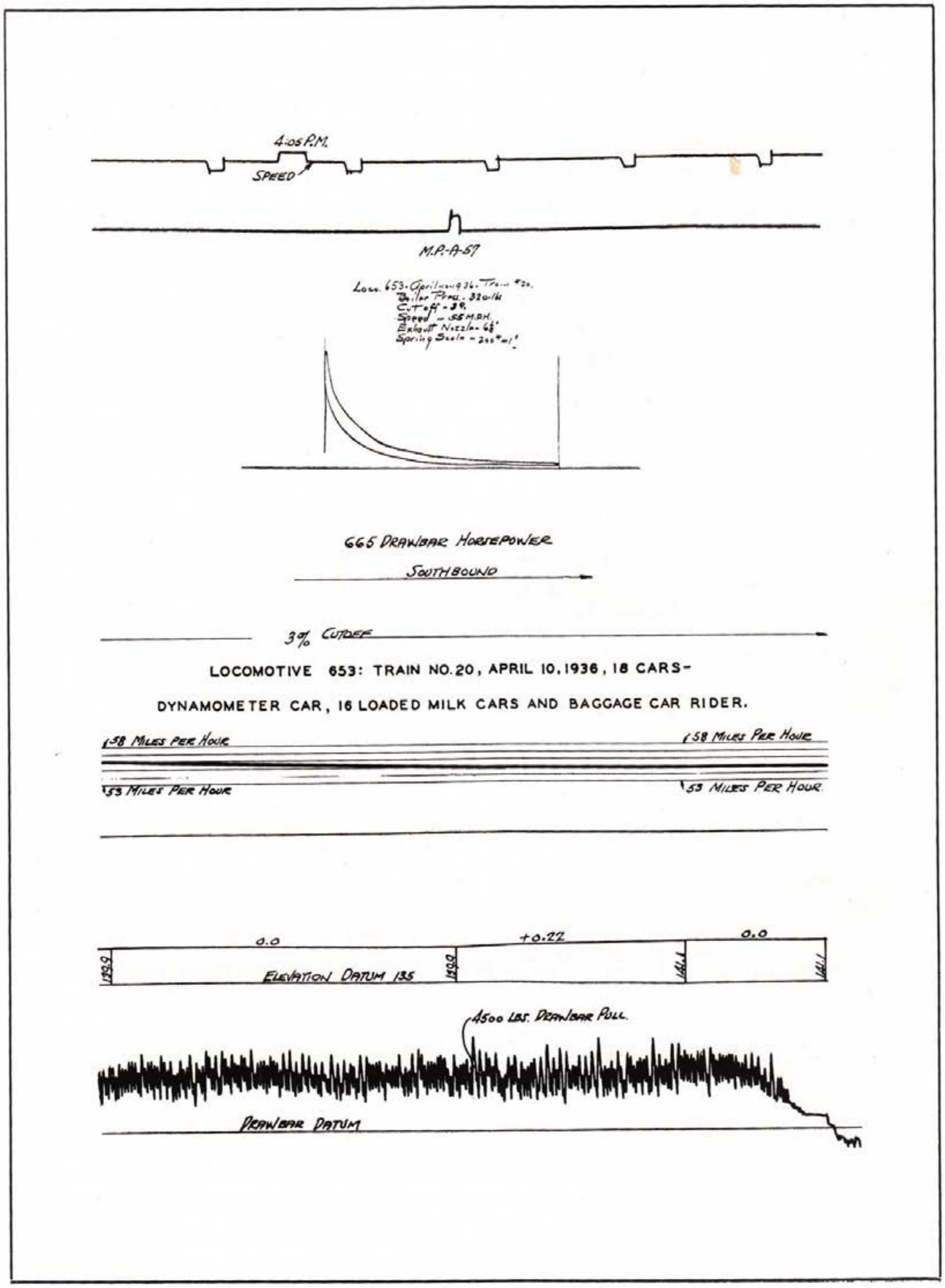
LOCOMOTIVE 652

Built by The Delaware and Hudson Railroad Corporation in 1929. Type 4-6-2. Gauge of Track 4′8½″. Cylinders, Diameter 22″, Stroke 28″. Driving Wheel Diameter 73″. Boiler, Straight Top, Inside Diameter 74½″, Pressure 260 Pounds. Fire Box, Length 116⅛″, Width 108″. Tubes, Superheater 142, Diameter 3½″, Length 19′7″, Ordinary 30, Diameter 2¼″, Length 19′7″. Wheel Base, Driving 13′0″, Engine 35′3½″, Engine and Tender 74′8½″. Weight, on Engine Truck 45000 Pounds, Drivers 185300 Pounds, Trailer 53000 Pounds, Total Engine 283300 Pounds, Engine and Tender 443800 Pounds. Fuel, Anthracite and Bituminous. Heating Surface: Tubes 2879, Fire Box 246, Arch Tubes 37, Total 3162 Square Feet, Superheater 1495 Square Feet. Tractive Power 41600 Pounds. Tender Capacity, Water 11000 Gallons, Fuel 14 Tons.

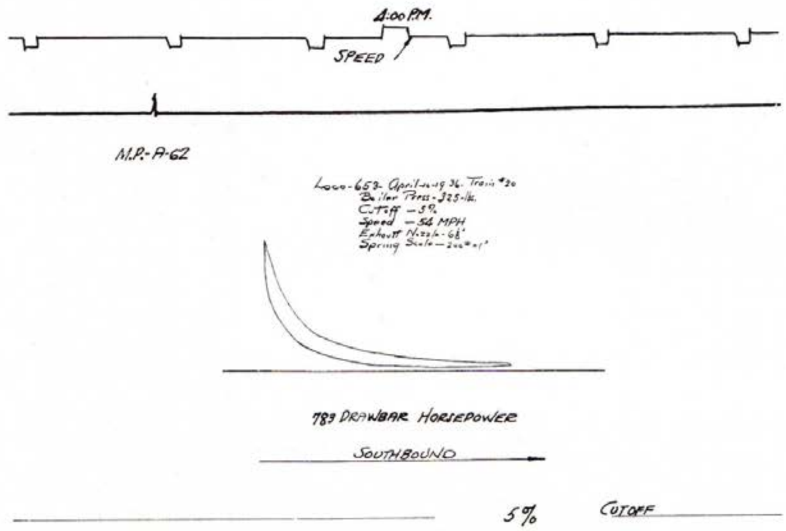


LOCOMOTIVE 653

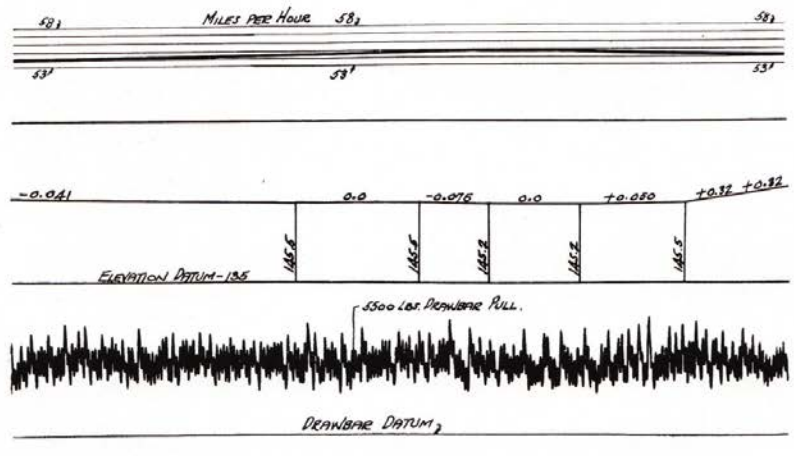
Built by The Delaware and Hudson Railroad Corporation in 1931. Type 4-6-2. Gauge of Track 4′8½″. Cylinders, Diameter 22″, Stroke 32″. Driving Wheel Diameter 73″. Boiler, Straight Top. Inside Diameter 74-9/16″. Pressure 325 Pounds. Fire Box, Length 116-1/16″, Width 107⅞″. Tubes, Superheater 142, Diameter 3½″, Length 19′7″, Ordinary 34, Diameter 2¼″, Length 19′7″. Wheel Base, Driving 13′0″, Engine 35′3½″, Engine and Tender 74′8½″. Weight, on Engine Truck 50500 Pounds, Drivers 191000 Pounds, Trailer 55000 Pounds, Total Engine 296500 Pounds, Engine and Tender 457000 Pounds. Fuel, Anthracite and Bituminous. Heating Surface: Tubes 2925, Fire Box 246, Arch Tubes 37, Total 3208 Square Feet, Superheater 1495 Square Feet. Tractive Power 59500 Pounds. Tender Capacity, Water 11000 Gallons, Fuel 14 Tons. Equipped with Rotary Type Poppet Valves.



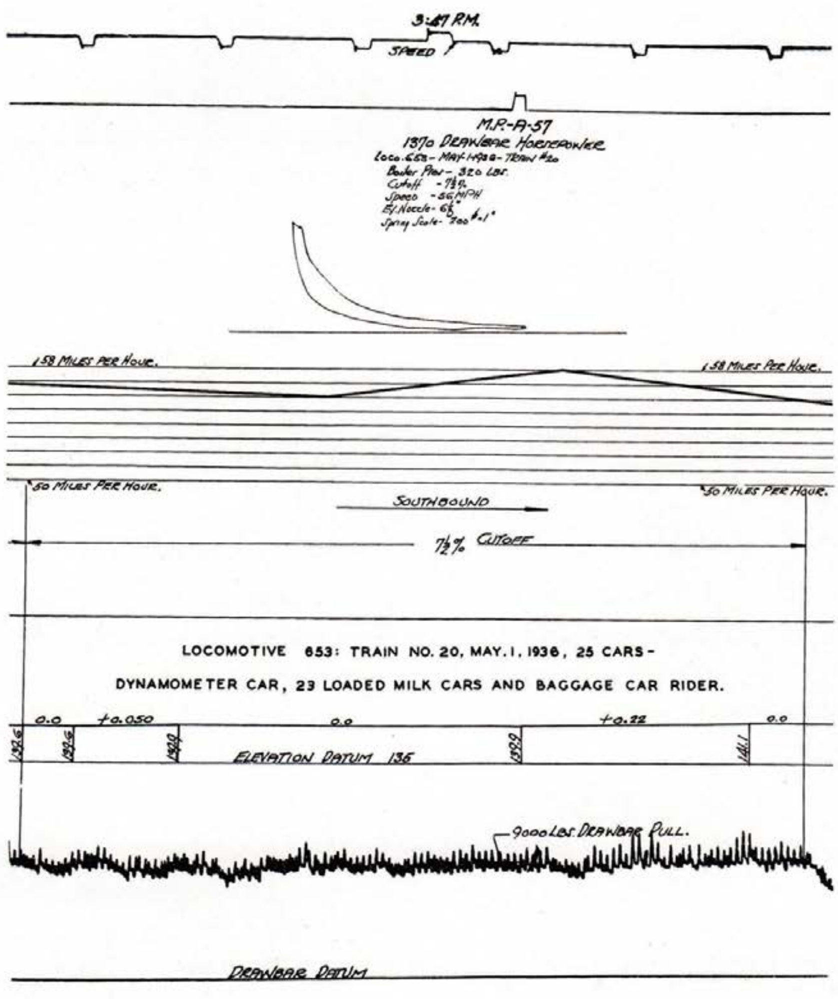
4:05 P.M.
SPEED
M.P.-A-57
Speed - 55 M.P.H.
665 DRAWBAR HORSEPOWER
SOUTHBOUND
3% CUTOFF
LOCOMOTIVE 653: TRAIN NO.20, APRIL 10, 1936, 18 CARS-
DYNAMOMETER CAR, 16 LOADED MILK CARS AND BAGGAGE CAR RIDER.
58 MILES PER HOUR
58 MILES PER HOUR
53 MILES PER HOUR
53 MILES PER HOUR
0.0
+0.22
0.0
ELEVATION DATUM 135
4500 LBS. DRAWBAR PULL
DRAWBAR DATUM

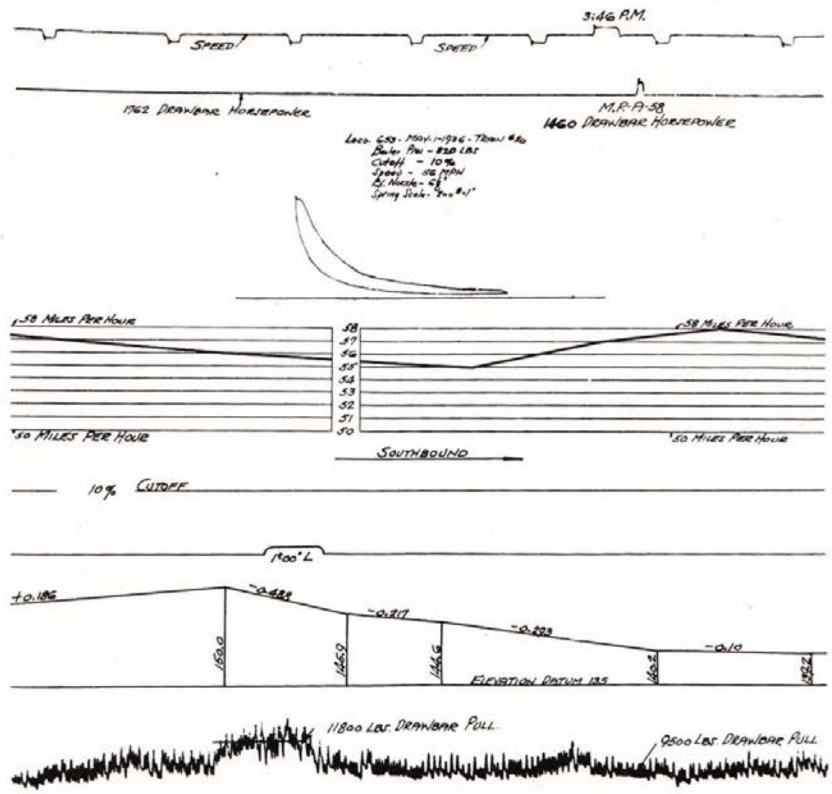


LOCOMOTIVE 653: TRAIN NO. 20, APRIL 10, 1936, 18 CARS-
DYNAMOMETER CAR, 16 LOADED MILK CARS AND BAGGAGE CAR RIDER.



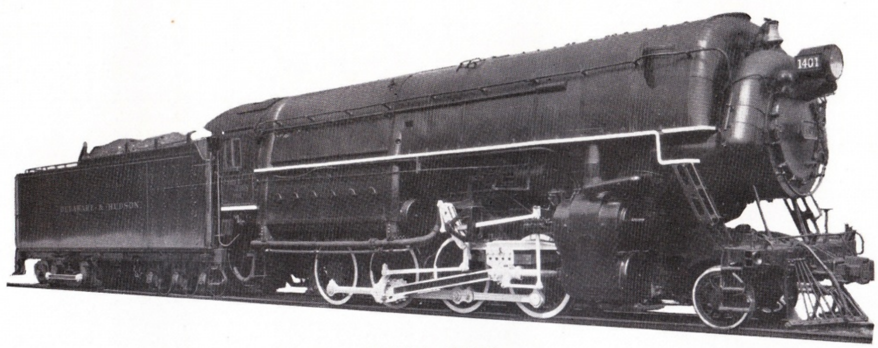
28


SPEED
M.P.-A-57
1370 DRAWBAR HORSEPOWER
58 MILES PER HOUR.
58 MILES PER HOUR.
50 MILES PER HOUR.
50 MILES PER HOUR.
SOUTHBOUND
7½% CUTOFF
LOCOMOTIVE 653: TRAIN NO. 20, MAY. 1, 1936, 25 CARS -
DYNAMOMETER CAR, 23 LOADED MILK CARS AND BAGGAGE CAR RIDER.
0.0
+0.050
0.0
+0.22
0.0
ELEVATION DATUM 135
9000 LBS. DRAWBAR PULL.
DRAWBAR DATUM



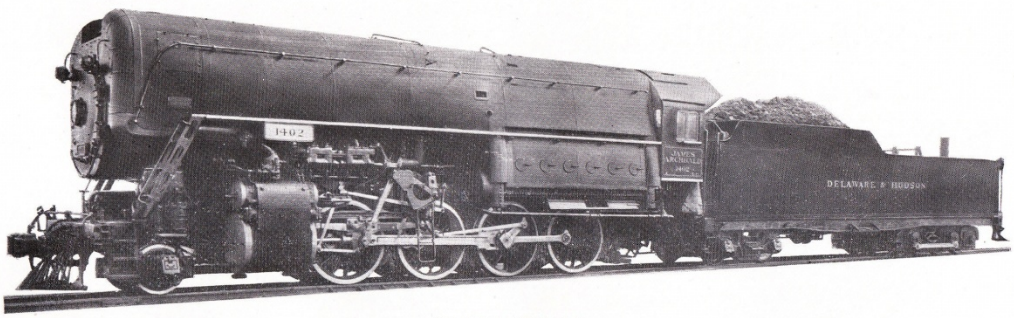
LOCOMOTIVE 653: TRAIN NO. 20, MAY. 1, 1938, 25 CARS -
DYNAMOMETER CAR, 23 LOADED MILK CARS AND BAGGAGE CAR RIDER.

DRAWBAR DATUM



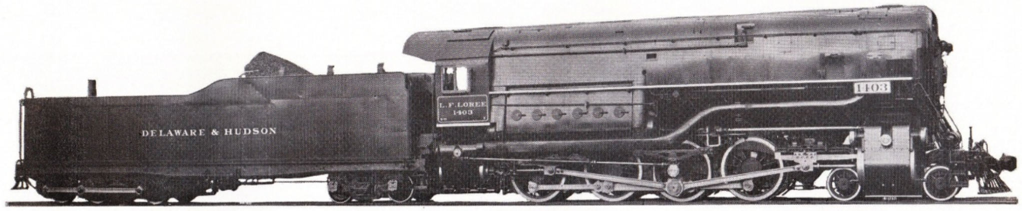
JOHN B. JERVIS

Built by American Locomotive Company in 1927. Type 2-8-0. Gauge of Track 4'8½". Cylinders, Diameter High Pressure 22¼", Low Pressure 38½", Stroke 30". Driving Wheel Diameter 57". Boiler, Water Tube Type, Diameter 61⅞", Pressure 400 Pounds. Fire Box, Length 152", Width 77⅝". Tubes, Superheater 52, Diameter 5½", Length 15'0", Regular 101, Diameter 2", Length 15'0". Wheel Base, Driving 18'0", Engine 29'0", Engine and Tender 74'11½". Weight in Working Order: Leading Truck 41500 Pounds, Driving 295000 Pounds, Engine 336500 Pounds, Engine and Tender 553400 Pounds. Fuel, Bituminous. Heating Surface: Tubes 788, Flues 1116, Fire Box 1150, Arch Tubes 67, Total 3121 Square Feet, Superheater 700 Square Feet. Tractive Power: Simple at 400 Pounds Boiler Pressure 85800 Pounds, Compound at 400 Pounds Boiler Pressure 71600 Pounds. Tender Booster at 400 Pounds Boiler Pressure 16200 Pounds. Tender Capacity, Water 12000 Gallons, Fuel 16 Tons.



JAMES ARCHBALD

Built by American Locomotive Company in 1930. Type 2-8-0. Gauge of Track 4′8½″. Cylinders, Diameter High Pressure 20½″, Low Pressure 35½″, Stroke 32″. Driving Wheel Diameter 63″. Boiler, Water Tube Type, Diameter 68-1/16″, Pressure 500 Pounds. Fire Box, Length 151-15/16″, Width 77-⅝″. Tubes, Superheater 52, Diameter 5½″, Length 15′0″, Regular 155, Diameter 2″, Length 15′0″. Wheel Base, Driving 18′0″, Engine 29′0″, Engine and Tender 80′½″. Weight in Working Order: Leading Truck 56000 Pounds, Driving 300000 Pounds, Engine 356000 Pounds, Engine and Tender 582600 Pounds. Fuel, Bituminous. Heating Surface: Tubes 1209, Flues 1116, Fire Box 1048, Arch Tubes 66, Total 3439 Square Feet, Superheater 1037 Square Feet. Tractive Power: Simple at 500 Pounds Boiler Pressure 85800 Pounds, Compound at 500 Pounds Boiler Pressure 71600 Pounds. Tender Booster at 250 Pounds Boiler Pressure 18000 Pounds. Tender Capacity, Water 14000 Gallons, Fuel 17½ Tons.



L. F. LOREE

Built by American Locomotive Company in 1933. Type 4-8-0. Gauge of Track 4′8½″. Cylinders, Diameter High Pressure 20″, Intermediate Pressure 27½″, Low Pressure 33″, Stroke 32″. Driving Wheel Diameter 63″. Boiler, Water Tube Type, Diameter 68-1/16″. Pressure 500 Pounds. Fire Box, Length 139-15/16″, Width 77¾″. Tubes, Superheater 52, Diameter 5½″, Length 15′0″, Regular 155, Diameter 2″, Length 15′0″. Wheel Base, Driving 18′10″, Engine 33′9″, Engine and Tender 83′8¾″. Weight in Working Order: Leading Truck 69000 Pounds, Driving 313000 Pounds, Engine 382000 Pounds, Engine and Tender 608400 Pounds. Fuel, Bituminous. Heating Surface: Tubes 1209, Flues 1116, Fire Box 965, Arch Tubes 61, Total 3351 Square Feet, Superheater 1076 Square Feet. Tractive Power: Simple at 500 Pounds Boiler Pressure 91500 Pounds, Triple at 500 Pounds Boiler Pressure 76200 Pounds. Tender Booster at 500 Pounds Boiler Pressure 18000 Pounds. Tender Capacity, Water 14000 Gallons, Fuel 17½ Tons. Equipped with Rotary Type Poppet Valves, Roller Bearings on Main Axle Boxes, Roller Bearings on Side and Main Rod Bearings of Main Crank Pin.

Comparative Summary of Tests, Locomotive 1402 "James Archbald," Locomotive 1400 "Horatio Allen"

Oneonta to Dante

	LOCOMOTIVE NUMBER	1402						1400	
	TEST NUMBER	39	33	31	35	17	41	29	31
1	Date	10-26-30	10-17-30	10-15-30	10-22-30	10-1-30	10-28-30	8-30-25	9-1-25
2	Actual Tons	3182	3199	3306	3359	3558	3804	3140	3719
3	Adjusted Tons	3542	3613	3690	3749	3960	4224	3524	4043
4	Number of Cars Loaded	52	58	53	57	59	59		
5	Number of Cars Empty	7	9	9	6	6	10		
6	Miscellaneous Equip. Dyn. Car, Coach 344	Dyn. Car	Both	Both	Both	Both	Dyn. Car		
7	Weather Conditions	Hazy	Clear	Rain	Cloudy	Cloudy	Cloudy		
8	Rail Conditions	Good	Good	Wet	Fair	Good	Fair		
9	Temp. of air, average deg. F.	47	73	63	45	56	51		
10	Elapsed Time, Mins.	99	95½	96½	111½	109	156¾	107½	116½
11	Detentions, Number	None	None	None	None	None	2		
12	Detentions, Total Minutes	None	None	None	None	None	37½		
13	Running Time, Minutes	99	95½	96½	111½	109	119¼	101	116½
14	Working Time, Minutes	97¼	95	94¾	108¾	108¼	115½	98	114¾
15	Drifting Time, Minutes	1¾	½	1¾	2¾	¾	3¾	3	1½
16	Working Miles	28.1	28.5	28.0	27.8	28.4	28.0	27.9	28.3
17	Drifting Miles	.5	.1	.6	.8	.2	.6		
18	Miles per Hour, Running	17.3	18.0	17.8	15.4	15.8	14.4	17.1	14.8
19	Miles per Hour, Working	17.3	18.0	17.7	15.3	15.7	14.5	17.1	14.8
20	Miles per Hour, Drifting	17.2	12.0	20.5	17.4	16.0	9.6		
21	Booster Operated, Minutes	None	None	None	None	None	3¾	None	None
22	Booster Operated, Miles	None	None	None	None	None	.3	None	None
23	Locomotive Simpled, Minutes	None	None	None	None	None	None	None	None
24	Locomotive Simpled, Miles	None	None	None	None	None	None	None	None
25	Steam Pressure, Boiler, Average, Lbs.	494	495	497	492	493	496	346	349
26	Steam Pressure, Throttle, Average, Lbs.	488	490	493	487	489	488		
27	Steam Pressure, Branch Pipe, Average Lbs.	479	490	491	483	479	485	338	341
28	Steam Pressure, Receiver, Average Lbs.	127	134	134	132	144	137	98	93
29	Steam Pressure, Exhaust, Average Lbs.	8.5	9.9	10.3	10.6	10.8	9.9	10.0	9.0
30	Steam Pressure, Booster, Average Lbs.	—	—	—	—	—	158	—	—
31	Steam Temperature, Branch Pipe, Deg. F.	622	627	637	624	640	634	545	547
32	Steam Temperature, Receiver, Deg. F.	398	401	404	407	424	412	331	330
33	Steam Temperature, Exhaust, Deg. F.	234	237	239	238	242	241	219	216
34	Temperature, Flue Gas, Deg. F., Average	507	545	576	526	583	545	620	658
35	Temperature, Water to Boiler, Deg. F. Average	208	221	215	212	217	218		
36	Temperature, Water in Tank, Deg. F. Average	54	60	60	55	58	55	69	70
37	Vacuum, Front End, Inches of Water, Average	3.3	3.5	3.6	3.5	3.7	3.7	11F 7.2B	10F 6B
38	Vacuum, Fire Box, Inches of Water, Average	1.1	1.0	1.1	1.2	1.1	1.1	1.9	1.7
39	Moisture in Steam, Per Cent, Average	1.8	1.5	1.8	1.7	1.8	1.8		
40	Dabeg Pump Used	Yes	Yes	Yes	Yes	Yes	Yes		
41	Injector Used, Minutes	No	No	No	No	No	2	Yes	Yes
42	Pops, Times Opened	None	2	None	2	2	2		
43	Pops, Total Minutes	None	½	None	1¼	½	1¼		

Comparative Summary of Tests, Locomotive 1402 "James Archbald," Locomotive 1400 "Horatio Allen"
Oneonta to Dante, Concluded

	LOCOMOTIVE NUMBER	1402						1400	
	TEST NUMBER	39	33	31	35	17	41	29	31
44	Coal, Kind	100% Bit	100% Bit	100% Bit	100% Bit	100% Bit	100% Bit		
45	Coal, Quality	Good	Good	Good	Fair	Good	Good		
46	Coal, Per Cent Moisture	1.81	1.64	1.50	1.31	1.95	1.50		
47	Coal, BTU per Lb. Dry	13265	13518	13350	13160	13487	13338		
48	Coal, Lbs. as Fired	5750	5650	5750	6550	7150	6900	7257	7834
49	Coal, Lbs. as Fired per Hour	3550	3570	3645	3610	3960	3580	4443	4100
50	Coal, Lbs. per 1000 Ton Mile, Actual	63.1	61.8	60.8	68.2	70.3	63.4		
51	Coal, Lbs. per 1000 Ton Mile, Adjusted	56.7	54.7	54.4	61.1	63.2	57.1		
52	Dry Coal per Hour, Lbs.	3480	3510	3590	3565	3885	3525		
53	Lbs. Dry Coal Fired per Sq. Ft. Grate per Hr.	42.5	42.8	43.8	43.5	46.4	43.0	62.2	57.5
54	Water, Gals. from Tank	4875	4850	4950	5450	5875	6625	7000	7900
55	Water, Lbs. from Exhaust Steam	6240	6720	6540	7260	8000	9200		
56	Steam, Total Lbs.	46865	47135	47790	52575	56955	64405	58310	65807
57	Allowance, Pops and Calorimeter, Lbs.	330	465	320	765	495	840	850	550
58	Dry Steam to Cylinders and Auxiliaries, Lbs.	46535	46670	47470	51810	56460	63565	57295	65255
59	IHP High Pressure Cylinder, Average	955	1057	1063	954	967	909	990	930
60	IHP Low Pressure Cylinder, Average	1018	1077	1085	994	1073	979	928	819
61	IHP Total	1973	2134	2148	1948	2040	1888	1918	1749
62	Coal as Fired per IHPH, Lbs.	1.8	1.67	1.7	1.85	1.65	1.89	2.31	2.34
63	Dry Coal per IHPH, Lbs.	1.76	1.64	1.67	1.82	1.56	1.87	2.25	2.28
64	Dry Steam per IHPH, Lbs.	14.6	13.7	14.0	14.7	15.4	17.5	18.3	19.5
65	Draw Bar Pull, Lbs. Average	37400	37700	41800	44900	43300	45400	39700	45800
66	Draw Bar Horse-power, Average	1697	1855	1865	1799	1846	1657	1710	1710
67	Coal as Fired per DBHPH, Lbs.	2.09	1.92	1.96	2.00	2.14	2.16	2.59	2.40
68	Dry Coal per DBHPH, Lbs.	2.05	1.89	1.92	1.97	2.09	2.13	2.51	2.33
69	Dry Steam per DBHPH, Lbs.	16.9	16.0	16.1	15.9	17.0	19.9		
70	Efficiency of Boiler, Per Cent	71.3	70.5	71.7	70.0	68.8	80.0	74.8	78.2
71	Mechanical Efficiency of Locomotive, Per Cent	86.0	87.1	86.8	92.4	90.5	87.8	89.2	97.6
72	Thermal Efficiency of Locomotive, Per Cent	9.37	9.95	9.97	9.83	9.05	8.97	7.43	8.23
73	Evaporation	8.14	8.34	8.31	8.03	7.96	9.32	8.03	8.39
74	Factor of Evaporation	1.168	1.155	1.168	1.163	1.168	1.160		
75	Mechanical Efficiency of Locomotive, Corrected	90.7	90.7	90.7	96.0	94.4	91.3		
76	Thermal Efficiency of Locomotive, Corrected	9.9	10.4	10.4	10.3	9.5	9.3		

DATA BELOW WITH REFERENCE TO LOCOMOTIVE 1402 ONLY.

ALL TESTS: Run over track 4, Schenevus Grade, Engineer Godard, Fireman Meckle.
Wind velocity maximum 11 MPH, Average 7 MPH: Firebox temperature average 2400 deg. F.
Ash pan vacuum 0.0 to 0.1 inches of water.
Weight of locomotive or caboose not included in tonnage figures.
Steam used by booster included in steam to cylinders and auxiliaries. IHP of booster not included in total IHP.
Items 66, 67, 68, 69, 71 and 72 based on dynamometer car readings.
Items 75 and 76 corrected for grade resistance of locomotive and tender.

Feb. 25, 1931

Under "Resume," page number 89, of the 1926 Monograph, we read

Quoting: "The next twenty years to 1850 mark a development to basically the prevailing principles of design of today.
"Progress thereafter has been along the lines of increase in capacity, efficiency, weight and refinement of details."

Prevalent with the Public is the thought expressed in the first sentence. Knowledge of the changes wrought in the modern locomotive under the second is very meager. With the automobile, to which analogy is often had, a distinct evolution has taken place in the past ten years. Great as is the latter, a searching study of the locomotive progress in this period would challenge any comparison tinged with odium. On the one hand we have publicity to the limit; on the other very limited portions.

It is without the province of this book to fully detail changes in the art in the past Decade. It has however seemed wise to present some of the trends in design and the experimental research had on your Property, which is illustrative to a greater or less extent of that of the railways of the United States as a whole.

STEAM PRESSURES

Saturated steam at 200 pounds gauge pressure contains 1198.7 B.T.U. per pound and has a temperature of 387.93 degrees F. To raise this pressure to 325 pounds requires the addition of only 4.7 B.T.U. which brings the total B.T.U. to 1203.4 and the temperature to 428.96 degrees F., an increase of 41.03 degrees F.

Superheated steam at 200 pounds gauge pressure with 300 degrees F. of superheat contains 1366.01 B.T.U. and has a temperature of 687.93 degrees F., whereas 325 pounds pressure with the same superheat has 1381.52 B.T.U. and a temperature of 728.96 degrees F., all of which increase in pressure and temperature is obtained by the addition of only 15.51 B.T.U.

To raise pressure from 200 pounds saturated steam to 500 pounds saturated steam requires the addition of 4.85 B.T.U., which brings the total B.T.U. to 1203.55 and the temperature to 470.05 degrees F. an increase of 82.12 degrees F. Superheated steam at 500 pounds gauge pressure with 300 degrees F. superheat contains 1396.00 B.T.U. and has a temperature of 770.05 degrees F., all of which increase in pressure and temperature over that of 200 pounds gauge pressure and 300 degrees F. superheat, is obtained by the addition of 29.99 B.T.U.

Boiler pressures of the locomotives built in the years immediately preceding our Decade were quite generally 205-210 pounds. Some of the outstanding exceptions were

YEAR	RAILROAD	Type	Pounds Steam Pressure
1919	United States Railroad Administration	2-8-8-2	240
1922	Pennsylvania	2-10-0	250
1923	Denver & RioGrande Western	2-8-8-2	240
1923	Northern Pacific	2-8-8-2	240
1925	Pennsylvania	0-8-0	250
1925	Texas & Pacific	2-10-4	250
1925	Lima A-1	2-8-4	240
1925	Boston & Albany	2-8-4	240

The prevailing opinion seemed to be, in and about 250 pounds was the economic ultimate with the conventional type, and experimentation in the field was more or less limited.

A distinct change in this respect has taken place in the Decade as evidenced by the following illustrative examples

CONVENTIONAL TYPE BOILER

YEAR	RAILROAD	Type	Pounds Steam Pressure
1926	Delaware & Hudson	2-8-0	265
1927	Delaware & Hudson	2-8-0	300
	New York, New Haven & Hartford	4-8-2	265
	Texas & Pacific	2-10-4	255
	Boston & Maine	0-8-0	250
	Delaware, Lackawanna & Western	4-8-4	250
	Grand Trunk Western	4-8-4	250
	Missouri Pacific	4-8-2	250
	Canadian National	4-8-4	250
	Erie	2-8-4	250
1928	Canadian Pacific	4-8-4	275
	Chicago, Burlington & Quincy	4-10-4	250
	Northern Pacific	2-8-8-4	250
	Central Vermont	2-10-4	250
1929	Delaware & Hudson	2-8-0	275
	Canadian National	4-8-4	250
	Chicago, Rock Island & Pacific	4-8-4	250
	Great Northern	4-8-4	250
	Chicago & North Western	4-8-4	250
1930	Delaware & Hudson	4-6-2	275
	Canadian National	4-6-4	275
	Canadian National	2-8-2	265
	Chesapeake & Ohio	2-10-4	260
	"Timken" 1111	4-8-4	250
	Bessemer & Lake Erie	2-10-4	250

YEAR	RAILROAD	Type	Pounds Steam Pressure
	St. Louis Southwestern	4-8-4	250
	Baltimore & Ohio	4-8-2	250
	Baltimore & Ohio	2-6-6-2	250
1931	Delaware & Hudson	4-6-2	325
	Atchison, Topeka & Santa Fe	2-10-4	300
	Canadian Pacific	4-6-4	275
	Canadian Pacific	2-8-2	265
	Lehigh Valley	4-8-4	255
	Wabash	4-8-4	250
	Chicago, Burlington & Quincy	4-8-4	250
	Chicago, Burlington & Quincy	4-6-4	250
1934	Boston & Maine	4-6-2	260
	Northern Pacific	4-8-4	260
1935	Chicago, Milwaukee, St. Paul & Pacific	4-4-2	300
	Lehigh Valley	4-8-4	275
	Chesapeake & Ohio	4-8-4	250
	Delaware, Lackawanna & Western	4-8-4	250

WATER TUBE TYPE BOILER

YEAR	RAILROAD	Type	Pounds Steam Pressure
1927	Delaware & Hudson	2-8-0	400
1928	Baldwin, No. 60000	4-10-2	350
1930	Delaware & Hudson	2-8-0	500
1931	New York Central	4-8-4	1300
	Canadian Pacific	2-10-4	250-850
1933	Delaware & Hudson	4-8-0	500
	Baltimore & Ohio	4-4-4	350
	Baltimore & Ohio	4-6-4	350

In Europe, early in the Decade, in England, France, Italy and Austria, in general, 200 pounds was representative practice. In Germany there obtained an awakened realization of the value of higher pressures. Today in Germany experimental studies are being made with 355 pounds. Quite generally 284 pounds is the recognized pressure for new power. In France 284-290 pounds is the standard with some of the roads. In England 250 pounds is being developed to some extent and on the London and Northeastern, locomotive 10000, water tube type boiler, has 450 pounds boiler pressure.

It will be noted we have: With the conventional type boiler 275, 300 and 325 pounds in service; with the water tube 350, 400 and 500 pounds. Our experience to date would seem to indicate pressure is not a factor of moment as to maintenance. Admittedly, this field of observation is limited and consequently before a positive determination of the foregoing is reached, a wider

range must be had. It should also be recalled, on the Delaware and Hudson the water conditions, generally speaking, are favorable and that which may obtain on this Property would not necessarily follow on another.

In the conventional field, it is our considered opinion, if and when its economic use is developed, 325 pounds will be the maximum, for the reason above this standard fittings and gadgets are not available; with the water tube, 500 pounds.

STEAM GENERATION

With the conventional boiler, from the "Stourbridge Lion" to and through all locomotive boilers as yet built, of which we have knowledge, the seams are of riveted construction. Having in mind the improvement in the art of fusion welding in the past Decade, under date of March 5, 1931 the question was submitted the American Locomotive Company whether or no they were in a position to construct a locomotive boiler by the fusion welding rather than the riveted seam process. As an outgrowth and in collaboration, a design and specification was prepared governing workmanship, material, supervision and inspection.

The viewpoint of the Motive Power people of America and Canada in general was developed in the main securing practically their unqualified approval.

Under date of January 13, 1936 the approval of the Committee on Locomotive Construction, Association of American Railroads was given in principle to the undertaking.

Under date of February 7, 1936 conference was held presenting the same to John M. Hall, Chief Inspector, Bureau of Locomotive Inspection, Interstate Commerce Commission, at Washington.

On March 11, 1936 his approval of the project was given, citing minimum requirements, with the qualification all details should have the approval of the General Committee, Mechanical Division, Association of American Railroads.

At this writing, April 10, working drawings governing the same are in preparation.

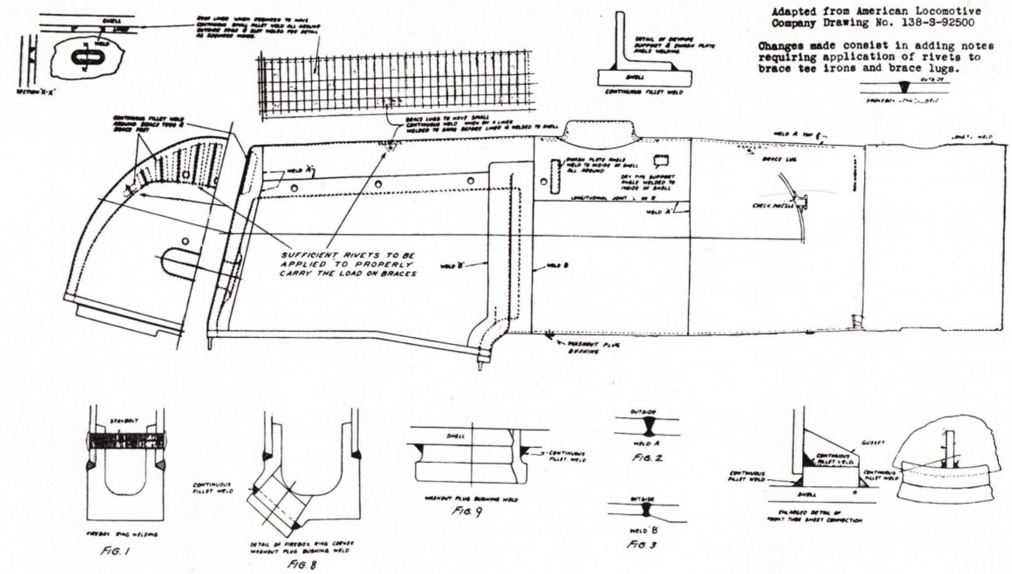
It is felt the construction of a locomotive boiler by the fusion welded rather than the riveted method possesses the following improvements

(a) Reduction to a minimum of caustic embrittlement;

(b) It is stress relieved;

(c) Having a smooth interior finish, the maintenance of a clean boiler is facilitated;

FUSION WELDED CONVENTIONAL TYPE LOCOMOTIVE BOILER



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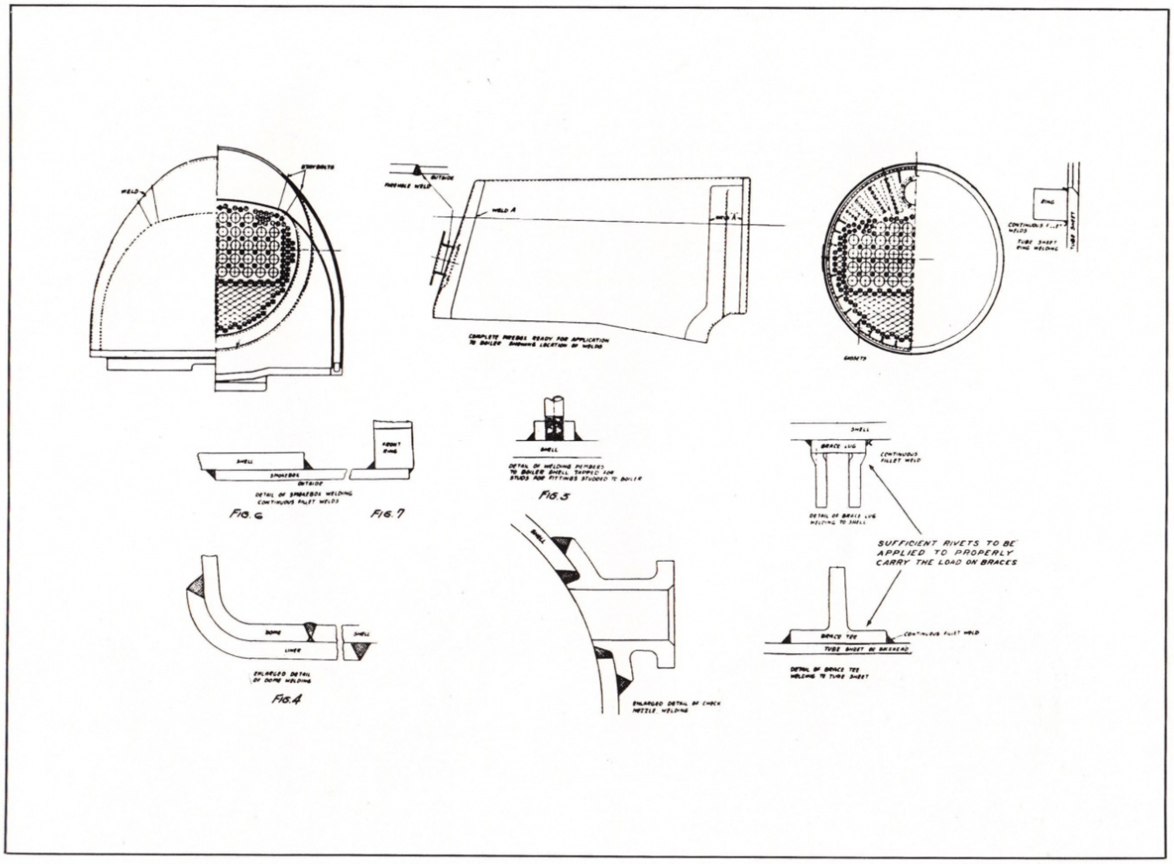


COMPLETE FIREBOX READY FOR APPLICATION TO BOILER SHOWING LOCATION OF WELDS
SHELL
SMOKEBOX
OUTSIDE
FRONT RING
DETAIL OF SMOKEBOX WELDING CONTINUOUS FILLET WELDS
FIG. 6
FIG. 7
SHELL
DETAIL OF WELDING MEMBERS TO BOILER SHELL TAPPED FOR STUDS FOR FITTINGS STUDDED TO BOILER
FIG. 5
SHELL
BRACE LUG
CONTINUOUS FILLET WELD
DETAIL OF BRACE LUG WELDING TO SHELL
SUFFICIENT RIVETS TO BE APPLIED TO PROPERLY CARRY THE LOAD ON BRACES
BRACE TEE
CONTINUOUS FILLET WELD
TUBE SHEET OR BACKHEAD
DETAIL OF BRACE TEE WELDING TO TUBE SHEET
DOME
LINER
SHELL
ENLARGED DETAIL OF DOME WELDING
FIG. 4
SHELL

(d) Pitting dangers are reduced;

(e) Weight reduction: with boiler selected, some three to four thousand pounds;

(f) Maintenance cost reduced;

(g) Concentrated stresses at riveted zones are eliminated, hence, a freer breathing boiler;

(h) Improved design is made possible;

(i) Freer water circulation will be had;

(j) The number of parts will be materially reduced.

Cuts illustrate the project.

STEAM GENERATION

In the railway field in general this period marks the full realization of the importance of draw bar horse power output of a locomotive, rather than its tractive power which in the earlier periods was its measuring stick. The boiler capacity, rather than the cylinders, became the major consideration in design,—grate areas, firebox volumes, and ample heating surfaces are essentials.

STEAM DISTRIBUTION

In simple cylinders with piston valves, the minimum effective cutoff is about twenty-five percent, which makes it impossible to efficiently utilize steam pressures, variously estimated, in excess of from 225 to 275 pounds.

Accordingly when locomotive 653 with 325 pounds pressure was built in 1931, a Modified Uniflow type of cylinders was used. The results had therefrom did not fully meet expectations and accordingly those with Rotary Type Poppet Valves were substituted. Previous experience with the Poppet Valve was had with locomotive 925, steam pressure 210 pounds, applied as of May 29, 1926, and locomotive 651, steam pressure 275 pounds, applied as of February 5, 1930, these two of the Oscillating Type.

The Rotary has a distinctive advantage when compared with the Oscillating Type, especially in the higher pressure bracket, as the release and closure points are independent of the admission and cutoff. In locomotive 653, expansion at all cutoffs continues to from 93 to 97 percent of the full stroke, whereas with the normal locomotive this is from 70 to 75 percent. Operation of this locomotive with nominal 3 percent cutoff, developing 665 draw bar horse power, and 5 percent cutoff, developing 900 draw bar horse power, is had over a considerable portion of the Property, with average passenger train lading.

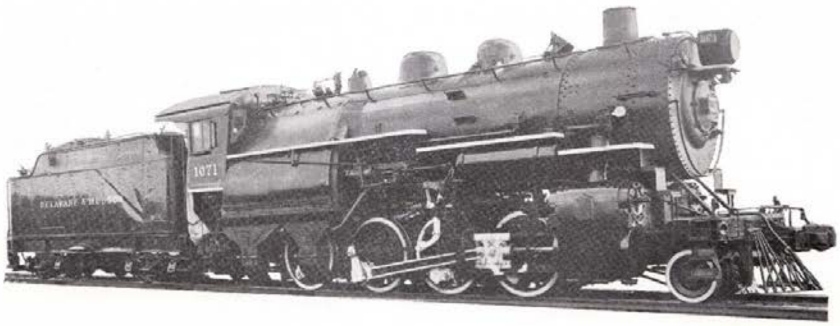
It has been found the use of the Poppet Valve necessitates an improved Craftsmanship above that obtaining in the general railway field.

While definite conclusions have not as yet been reached, this experiment is not lacking in encouragement.

For pressures much above 325 pounds, compounding is an essential. With the 350 pound pressure locomotive "Horatio Allen," number 1400, 400 pound "John B. Jervis," number 1401, and 500 pound "James Archbald," number 1402, the cross-compound principle was used. In the "L. F. Loree," 500 pound, number 1403, a further step was made using the triple expansion feature through the agency of the Poppet Valve. Business conditions has retarded experimental work with this locomotive.

STEAM TEMPERATURES

While improvement in this respect had been had, this Decade marks a broader awakening of the desirability of higher steam temperatures, and the development of lubrication and materials, permitting the use to and including 800 degrees Fahrenheit.



Roller Bearings

DRIVING JOURNALS

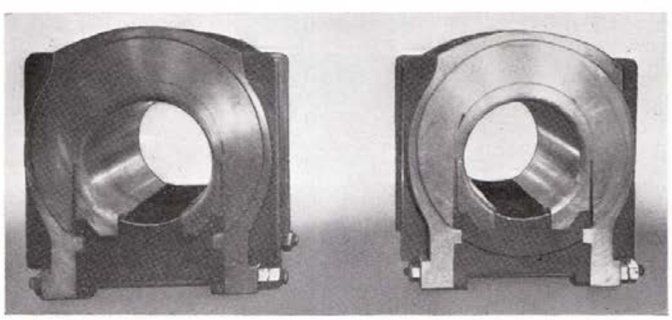
Outstanding in roundhouse maintenance is the need of removing the main drivers for the refitting of the driving box brasses. This occurs at varying mileages dependent on

First— Maintenance standards;
Second—Class of locomotive;
Third— Service conditions.

Generally speaking, such is necessary after from forty to fifty thousand service miles.

With limited exceptions today in the United States hard grease is used as a lubricant for these bearings. Its characteristics necessitate greater tolerances in fitting than obtains with oil.

When locomotive road number 1400, "Horatio Allen,"—cross-compound with high pressure, so lubricated, was received August 16, 1924, this phase of its service was carefully followed, resulting in the development of an oil-lubricated driving box, photographic illustration given. Its application June 12,



1925 gave a marked mileage improvement but it still fell short of the desired standard. Accordingly on January 7, 1927, the problem was referred to a manufacturer of roller bearings for study. It was felt such should

(a) Improve service reliability. No heating was anticipated, in fact, operating temperatures should be materially lower than either grease or oil on normal bearings, with consequent effect on journal material.

(b) Decreased attention should result in roundhouses as it was hopefully expected, from a maintenance standpoint, boxes would run from shop to shop; hence improved service availability.

(c) Lubrication attention and examination, instead of each trip or thereabouts, should only be necessary once in thirty days at washout period.

(d) Machine efficiency would be improved in proportion to the number of journals so equipped.

(e) It was felt a locomotive so equipped would maintain practically constant lateral shop to shop.

(f) As the lateral thrusts on the locomotive are taken care of in the bearings, hub heat would not obtain and hub wear factor would be eliminated.

(g) As the motion work is driven by a crank fixed as to position with this main shaft and the lost motion factor is practically eliminated, a decided improvement should be had in the valve events progressively as mileage increased compared with normal power.

(h) It was felt maximum lost motion between the frame jaws could be kept at twenty-thousandths, and if so the cylinder clearance of the locomotive materially reduced with consequent improvement in steam consumption.

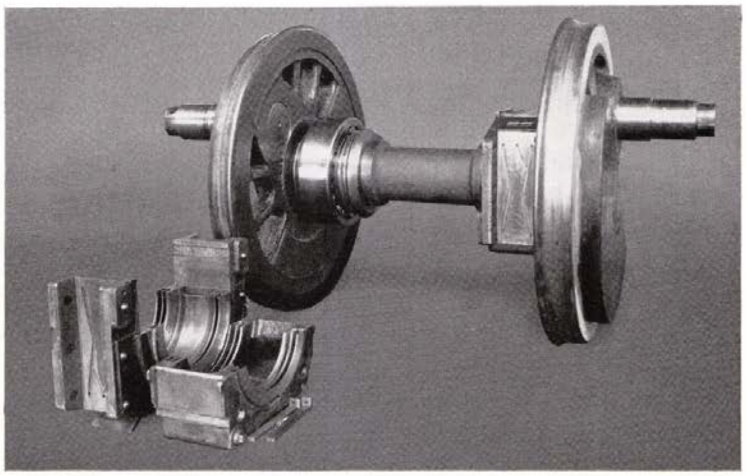
(i) The major problem existing with the main boxes, it was felt this represented the only immediate need.

(j) Due to a restriction of the crank pin movement in a horizontal plane, improvement would result in the wear of the rod brasses on the main pin.

On March 17, 1927, reporting the result of their investigation, the roller bearing people concluded the analysis of the problem:

Quoting: "We have given very careful consideration to all the details of this application and we regret very much it does not appear feasible to make such a test AT THIS TIME."

On March 19, 1930, three years later almost to a day, the subject was revived with the result locomotive road number 1071 left Colonie Shops on September 13, 1930, THE FIRST APPLICATION BY A RAILROAD OF ROLLER BEARINGS TO THIS PART OF A LOCOMOTIVE.



To date, similar application has been made to locomotives road numbers:

1403—"L. F. Loree" April 14, 1933
603—March 27, 1936
605—April 30, 1935
606—November 13, 1934
607—June 13, 1934
609—January 31, 1934

It is interesting to note

First— There has not resulted to date one minute's delay in service of a locomotive so equipped incident to their application.

Second—No wheels have been dropped for bearing attention.

Third— To date the ten phases of improvement expected have been fully realized.

Fourth—The "Hiawatha," the outstanding motive power development of 1935, has its driving journals similarly equipped.

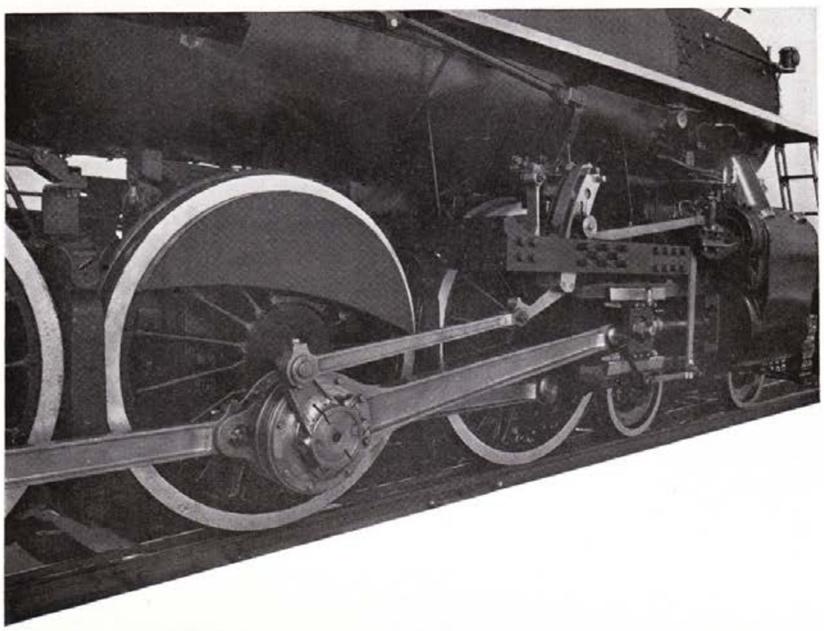
As to the service life, the answer will he had with accumulated mileage.

Nine years have elapsed since the problem was presented and the foregoing gives an encouraging progress report.

The forces of Nature, however, are not thus so easily conquered, and it remains in the investigation phase.

The challenge, stimulating one's courage, gives zest to such work.

ROD BEARINGS

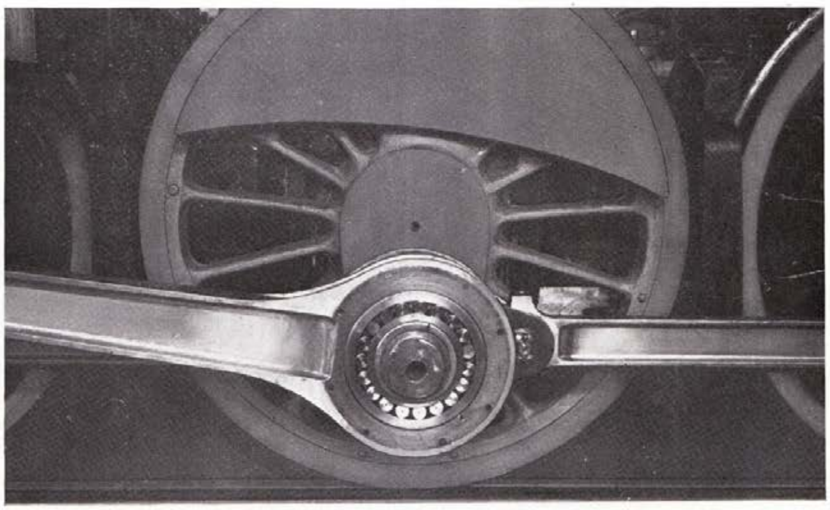


With the accumulated experience had with the roller bearings on main driving journals it was felt consideration should next be given to the rod bearings, both side and back end of main rod, on the main pin. While the subject had been under discussion to a greater or less extent, it was formally taken up with the roller bearing people April 19, 1933. Our correspondence of April 20, 1933, contained the following:

Quoting: "This confirms our conversation of yesterday about the possible development of a bearing for locomotive main rods.

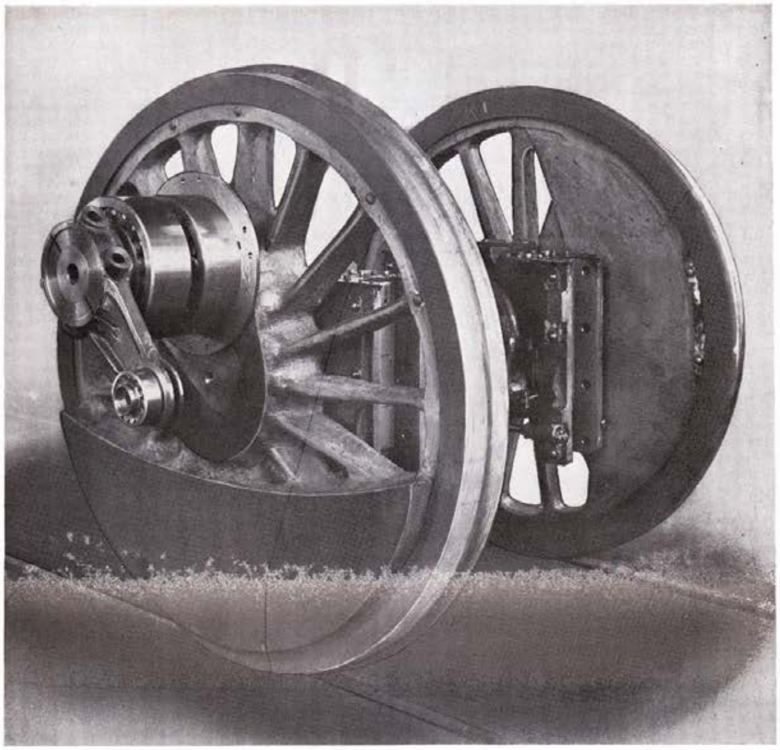
"We will make a searching analysis of this problem for your class 'P' locomotives, and will let you know the result of our study as soon as possible. It will probably take several weeks."

After several conversations a proposed design was submitted on September 1, 1933 and in cooperation with the A. L. Co. application was made to locomotive road number 609 at Colonie Shops as of January 31, 1934, photographic illustrations clearly showing method of application.



When placed in service some problems were presented in the development of a proper grease seal and experimental changes were made.

A second application was made to locomotive road number 605 as of April 30, 1935, and in addition the bearing on back end of eccentric rod was included, photographic illustration given.



To date, April 1, 1936, these bearings have made in excess of two hundred fifty thousand miles. With locomotive road number 609 two detentions have been had; with locomotive road number 605, none.

This problem is still deemed in the experimental stage and improvements are being made from time to time.

Alloy Steels

To enable the use of roller bearings on the main pins, the development of lighter weight rods was essential and accordingly materials possessing the following characteristics were used:

Chemical	Carbon,	0.25 to 0.35
	Manganese,	0.60 to 1.00
	Nickel,	2.50 to 3.00
	Phosphorus and sulphur max.	0.045
	Silicon,	0.20 to 0.30
Physical	Yield Point, Minimum,	75000 lbs. per sq. in.
	Desired,	80000 lbs. per sq. in.
	Tensile Strength, Minimum,	100000 lbs. per sq. in.
	Elongation, Minimum,	25% in 2"
	Reduction of Area, Minimum,	50%
	Desired,	60%

Such effected a thirty-seven and one-half percent weight reduction.

As with the automobile, likewise the locomotive, the alloy field is receiving searching study. It is, however, one problem to develop a steel for a service mileage of one hundred thousand and of limited mass, but quite another where this figure is two million and the weight very greatly multiplied.

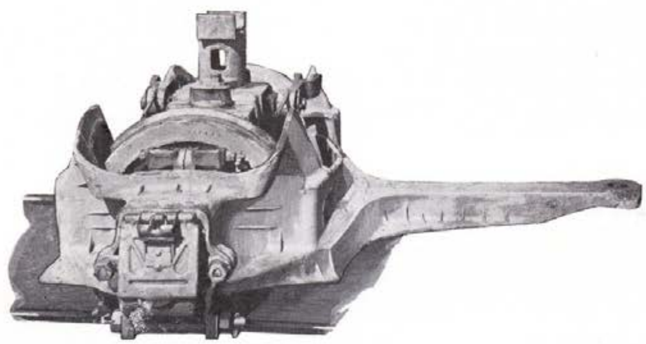
Steel Castings

This Decade has marked a substantial increase in the introduction of steel castings to replace what formerly had been built-up parts, consequently, very materially reducing the number of units entering into the construction of the locomotive as a whole.

A cut illustrating the combination of frames-cylinders-crossbars-tail castings, etc. in one piece, a development of the Commonwealth Steel Company of Granite City, Illinois, now the General Steel Castings Corporation, is given.

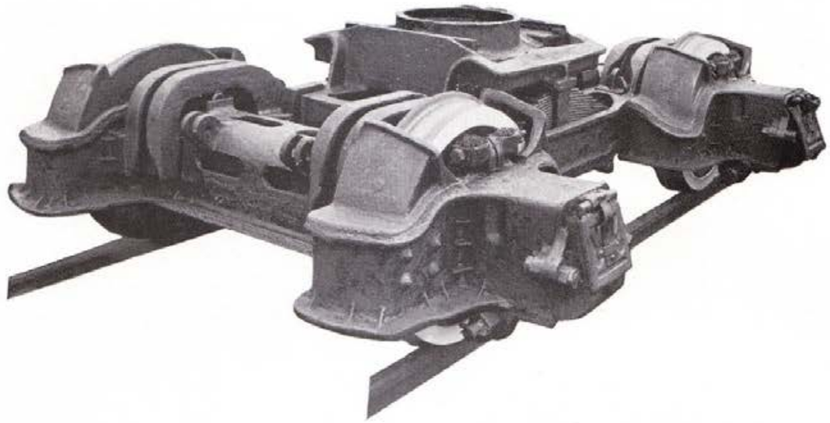
These were furnished September 1927 and applied to locomotive 1113, which left Colonie Shop October 20, 1927, and to the remainder of the class. This application was the third to be made by a Class 1 Railroad.

Cut illustration is given of the outside bearing cast steel engine truck applied to locomotive 1111, which left Colonie Shop December 29, 1926, a development of the A. L. Co., and the first of this type to be placed in service.



Cut illustration is also given of the application of the same principles by said Company of an engine truck applied to passenger locomotive 556, May 1927.

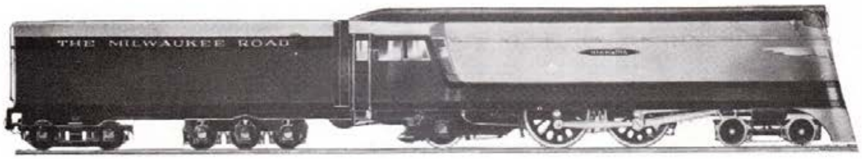
It is of more than passing interest to note we have not yet a record of a hot box with any of these outside bearing cast steel engine trucks.



A cut is given of the main driving wheels applied to locomotive 1403, "L. F. Loree," as of April 14, 1933, which represents one of the early applications.

This development was made by the A. L. Co. and was an essential in the proper balancing of the said locomotive.

The number of illustrations might be amplified indefinitely but these serve to indicate progressive alertness on the part of those in whose hands rests much of the continued improvement of the locomotive in its different phases.



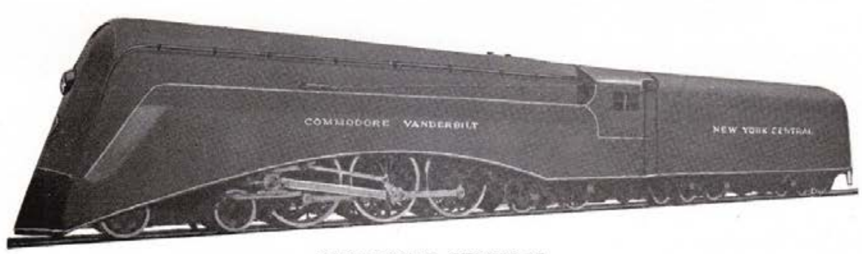
CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC

Streamlining

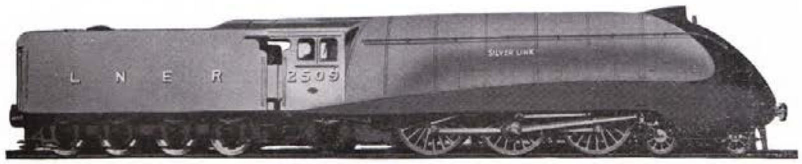
Contrary to the quite general accepted belief, streamlining while popular does not markedly lessen the expense of operation by reduction of Horse Power demands of normal passenger trains. Its value decreases materially with the length of the train and its efficiency is seriously nullified by quartering or broadside winds.

With a steam locomotive and ten seventy-five ton coaches of conventional type, in still air, at a speed of one hundred miles per hour, the air resistance represents forty-five percent of the total; at eighty miles per hour, thirty-six percent; and at sixty miles per hour twenty-five percent. At sixty miles per hour the air resistance may be reduced some thirty-six percent, nine percent of the total, by streamlining.

We have illustrated some eight forms in different countries which are being tried experimentally.



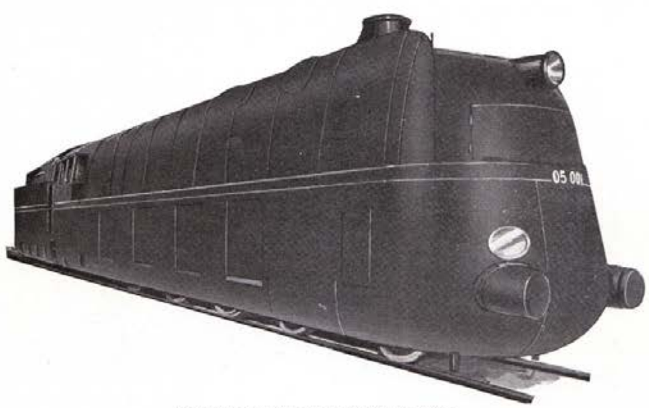
NEW YORK CENTRAL



LONDON & NORTHEASTERN RAILWAY

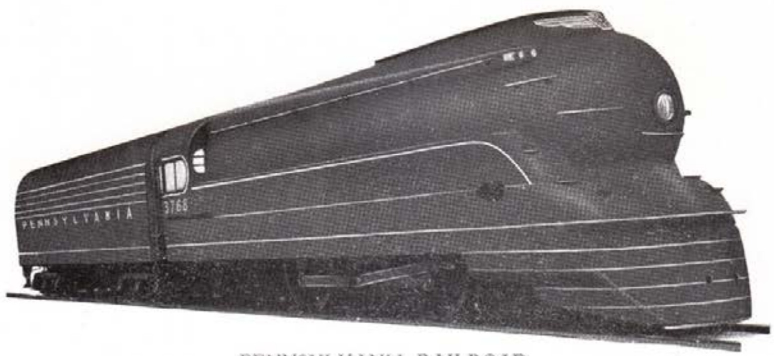
In the final analysis however practical utility will govern that which is best under the particular conditions obtaining. It adds non-productive weight. Labor costs both as to installation and delay of repairs incident to shrouding are factors of moment. Its value as an advertising medium will bear consideration but public favor needs continued stimulation as it is based on change. Innovations attract but for limited periods.

The physical characteristics and the nature of traffic on your property do not warrant serious consideration of this subject at this time. Beginning in 1929, on our passenger power, quite generally the exposed gadgets were being relocated effecting some improvement. An examination of the photographic illustrations will lead to the observations, the headlight has been inset, air pump has been placed between the frames, and sundry other improvements in this respect.

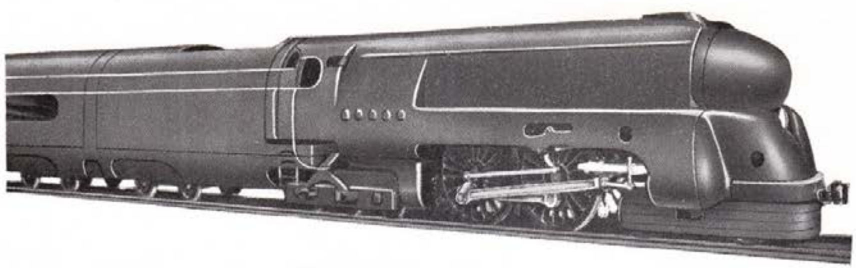


GERMAN STATE RAILWAYS

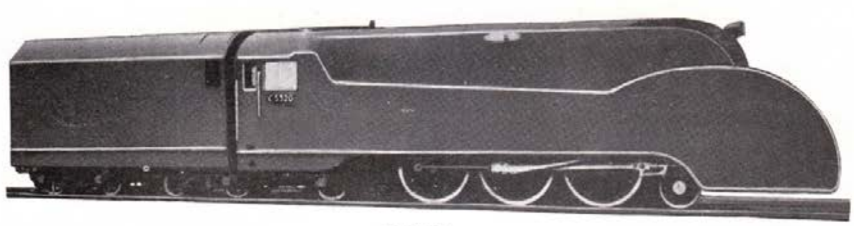
Further Streamlining



PENNSYLVANIA RAILROAD



DESIGNERS CONCEPTION



JAPAN

JAPAN

Blinkers

At the front of the passenger locomotives, plates will be noticed to which the name "Blinkers" has been given. Same are of European origin and have been adapted to American practice. Their purpose, especially important with low cylinder back pressure, is to ensure clear vision to the engineman at all times, eliminating trailing smoke and steam, and in coaches not air-conditioned more or less freedom from smoke and cinders.

10. February 2017 *BLHS Bulletin*, p. 9, with the caption given below

Erie 2-10-2 #4207 at Carbondale, Pa., on the D&H main on July 5, 1947. Although the D&H main line was leased from the Erie in perpetuity in 1870, the tracks weren't merged into the D&H until 1945. But even then, the Erie maintained trackage rights over its former line, although they didn't serve any customers on the line. C. A. Brown photo, collection of Robert K. LaPorte; BLHS Archives.

Portion of S. R. Powell Letter to the Editor of the *BLHS Bulletin* for April 2017:

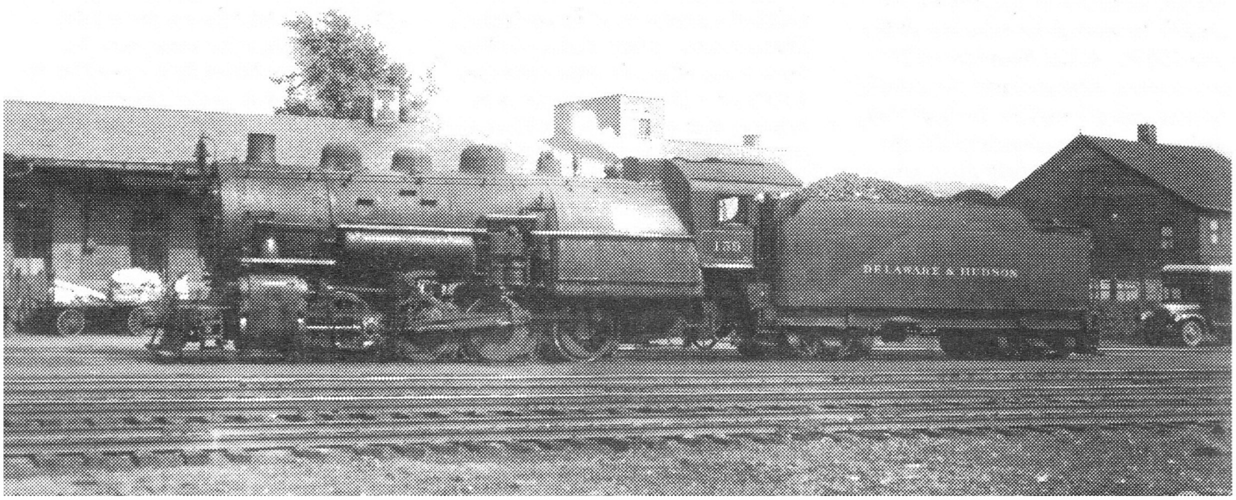
"The 34.6-mile long Jefferson Branch of the Erie from Carbondale to Lanesboro, over which the D&H had trackage rights, opened on October 10, 1870. D&H trackage rights over the line, it should be noted, were never granted in perpetuity to the D&H by the Erie. Rather, those rights were granted for fixed periods of time.

On January 1, 1955, when the D&H purchased outright the Jefferson Branch from the Erie for $3.5 million dollars, the lease agreement in effect between the D&H and the Erie at that time was a one hundred year lease agreement that the D&H and the Erie entered into on January 1, 1898, that lease agreement having been signed by R. M. Olyphant for the D&H and by E. B. Thomas for the Erie. Interestingly enough, after having purchased outright the Jefferson Branch in 1955 from the Erie, the D&H then granted the Erie trackage rights over the line until 2015.

Very nice to see the C. A. Brown photo of Erie 2-10-2 #4207 at Carbondale on July 5, 1947 on page 9 of the February issue. The train is shown here, heading north, on the D&H main line into Carbondale, with Duffy's Field to be seen in the background of the photograph. Following its arrival in Carbondale and its passage through the D&H yard, the train would then move onto the Jefferson Branch of the Erie, which began at the north end of the Carbondale yard and extended to Lanesboro.

To avoid any possible confusion about (1) the point of beginning of the Jefferson Branch of the Erie, (2) the lease arrangements that were entered into over the years by the D&H and the Erie regarding the Jefferson Branch , and (3) the ownership of the Jefferson Branch of the Erie over the years, therefore, lines 3-6 of the caption on the photograph of Erie #4207 on page 9 of the February 2017 BLHS *Bulletin* should, I think, read: "Although the D&H main line from the north end of the Carbondale yard to Lanesboro was leased from the Erie beginning in 1870, the Jefferson Branch of the Erie wasn't merged into the D&H until January 1, 1955 [not "1945"], when the D&H purchased outright for $3.5 million dollars the Jefferson Branch from the Erie."

11. March 2017 *BLHS Bulletin*, p. 13, with the caption given below

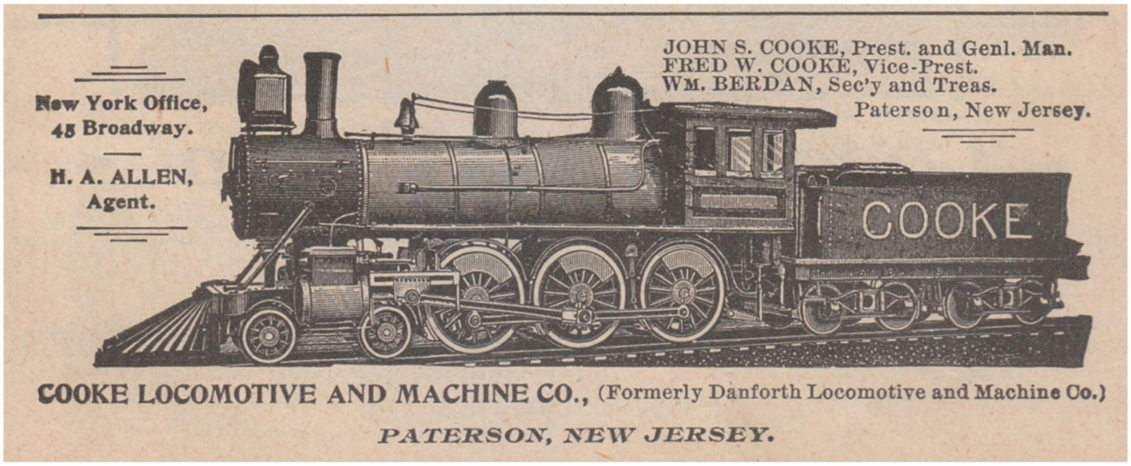


This D&H class B7 0-89-0 switcher had an interesting past. The D&H assembled it in March 1928 from parts of two Consolidations: the boiler from E5 #1040 and the frame of E5 #1027. Here the results pauses [sic] at the Carbondale, PA depot. From the collection of Jim Odell, photographer and date unknown.

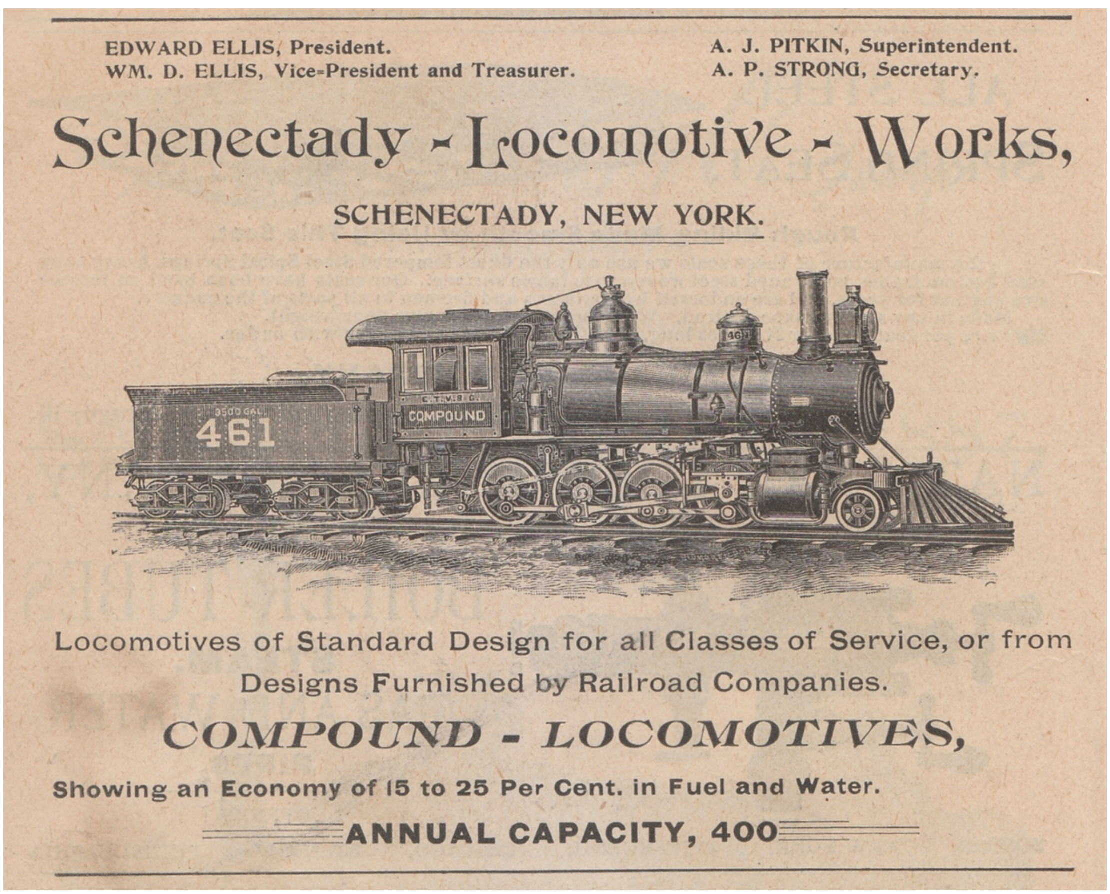
12. On Challengers: Jerry Gilhooley (P. O. Box 33, Union Dale, PA 18470) to the author, November 9, 2014: “The Challengers went as far south as Green Ridge. They couldn’t go south of Lackawanna Avenue, because they couldn’t make the curves. The 1200s and the diesels could [make the curves].”

13. Given below are the advertisements for the six primary makers of steam locomotives in America in 1893. These advertisements are given on pages 21-23 of the “Advertisers” section at the back of *Locomotive Firemen’s Magazine,* Volume XVII, No. II, November 1893:

Cooke Locomotive and Machine Co., Paterson, New Jersey

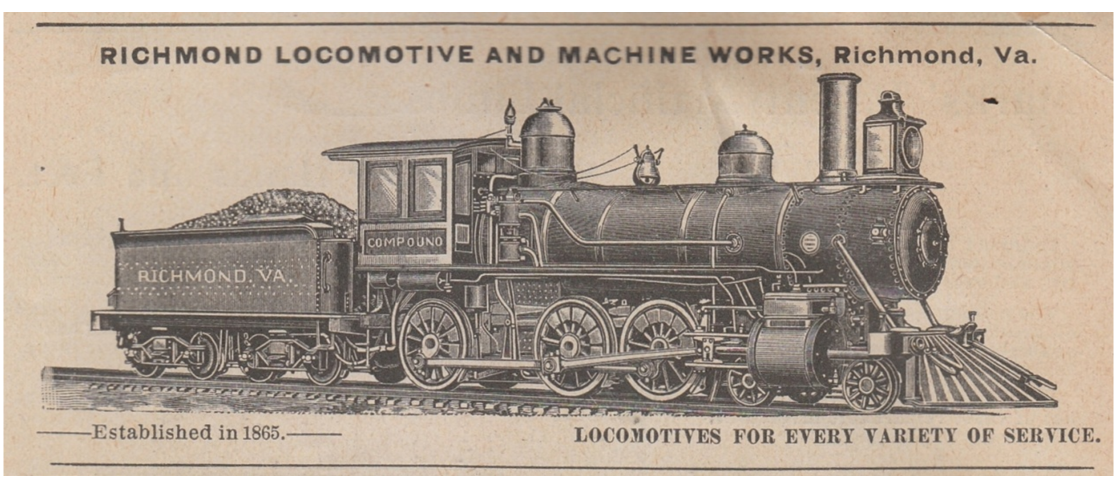


Schenectady Locomotive Works, Schenectady, New York

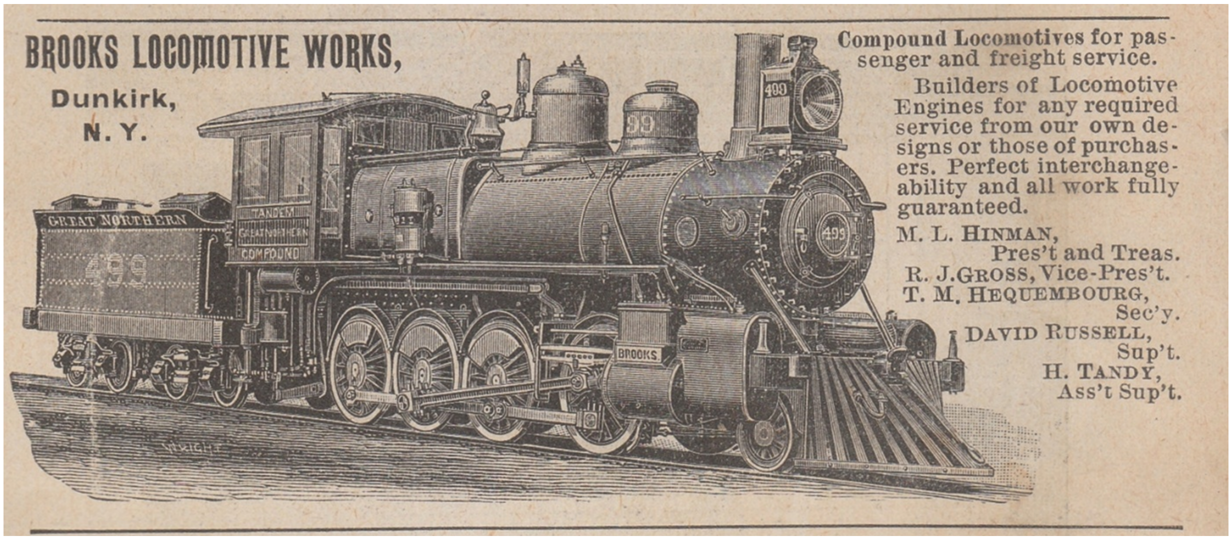


Baldwin Locomotive Works, Philadelphia, PA

Richmond Locomotive and Machine Works, Richmond, VA



Brooks Locomotive Works, Dunkirk, NY



Pittsburg Locomotive and Car Works, Pittsburgh, PA

14. Brotherhood of Locomotive Firemen:

The Brotherhood of Locomotive Firemen and Enginemen was a North American railroad fraternal benefit society and trade union in the nineteenth and twentieth centuries. The organization began in 1873 as the Brotherhood of Locomotive Firemen, a mutual benefit society for workers employed as firemen for steam locomotives, before expanding its name in 1907 in acknowledgement that many of its members had been promoted to the job of railroad engineer.
Gradually taking on the functions of a trade union over time, in 1969 the B of LF&E merged with three other railway labor organizations to form the United Transportation Union.

The B of LF in this early period organized itself into a network of "lodges," which provided a place for members to meet others in the profession to discuss matters of common concern. Social functions such as balls and picnics were periodically conducted under the B of LF's auspices. The organization also published a monthly magazine, *The Firemen's Magazine* later *Locomotive Firemen's Magazine,* including railroad news of the day and articles appealing to the membership's professional interests. Little attention was paid to labor-management relations, with the B of LF mildly offering the suggestion that "the oldest firemen in service" should be promoted to positions as engineers "when they are competent and worthy, and opportunity offers."

The early B of LF took the form of a secret society, complete with an elaborate initiation ritual, membership oaths, secret signs of recognition, and formulaic protocol for the conduct of lodge meetings. Much of the original inspiration in this regard derived from the traditions of Freemasonry. Meetings formally opened with a prayer conducted by the lodge chaplain and were modest and subdued, emphasizing the sacred task of the organization and the need for members to maintain appropriate decorum and professionalism in daily life.

The officials of the Subordinate Lodges of the Brotherhood of Locomotive Firemen are listed in the supplementary pages of the November 1893 edition (Volume XVII, No. 11) of the *Locomotive Firemen's Magazine* as follows:

The Carbondale Lodge was the Vanbergen Lodge:

62. VANBERGEN; Carbondale, Pa.
Meets in Odd Fellows' Hall, 2d and 4th Sundays at 2 P. M.
E. F. Atkinson, 122 Belmont st . . . . . . Master
G. P. Berry, 83 Park st . . . . Secretary
J. E. McCawley, 30 River st . . . . . . Collector
W. H. Brokenshire, 51 Garfield ave . . Receiver
Jos. Wilcox, 58 Canaan st . . . . Magazine Agent

The Oneonta Lodge was the Susquehanna Lodge:

71. SUSQUEHANNA; Oneonta, N. Y.
Meets in Red Men's Hall 2d and 4th **Monday** evenings.
F. A. Yorkey, 178 Main st . . . . Master
W. P. Emery, 66½ Deitz st . . . . Secretary
J. N. Stone, 4 Fairview st . . . . Collector
Jas. Walters, 9 Baker st . . . . Receiver
Jas. Walters, 9 Baker st . . . . . Magazine Agent

Ladies' Society of Brotherhood of Locomotive Firemen

The Carbondale lodge was the Progress Lodge:

26. PROGRESS ; Carbondale, Pa.
Mrs. G. W. Osborne, 158 Canaan st . . President
Mrs. Geo. Brandon, 154 Belmont st . . Secretary
Mrs. G. P. Berry, 83 Park st . . . . . . Treasurer

1907

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